POPULAR Computing WEEKLY

35p 26 May-1 June 1983 Vol 2 No 21

This Week

News Desk

Dragon goes across the pond!

DRAGON microcomputers will go on sale in America in August

This is the result of negotiations now in the final stages between Dragon Data and the American manufacturer Tano, who will assemble distribute and sell the computer in the US

The American Dragons will be the first fruits of a new joint venture set up by the two companies called Dragon Tano Inc Dragon Data holds a 49 percent share in the new company — Tano holds the remaining 51 percent

Tano will begin by manufacturing 2 000 machines a week, supplemented initially by machines built by Dragon in this country"

The Dragon 32 will sell for $300 (about £185) and the Dragon 64 will sell for $400 (about £250) As well as being adapted to work with the US NTSC television system, the American Dragons differ from their UK relatives in that they

Continued on page 4

Softek compiler payments dispute

SILVERSOFT and Softek have clashed head-on in a dispute over royalty payments for a program written using a compiler

The argument concerns the Silversoft program *Slippery Sid* which was written using the *Super C* Spectrum compiler from Softek

Softex is claiming that Silversoft has infringed copyright and broken a contract of sale of the *Super C* program by using the compiler to develop a commercial arcade game without permission The company is insisting — and Silversoft is steadfastly denying — that a royalty payment must be made by Silversoft to Softek on every *Slippery Sid* tape sold

Softek is now considering legal action, possibly involving an injunction this week to halt sales of the *Slippery Sid* program pending resolution of the dispute

Softek's Tim Langdell explained that the *Super C* program — written by Andrew Glaister — is sold subject to the condition that it is not used to write commercial programs

Continued on page 4



Classified

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Free readers entries to buy or sell a computer
Ring 01 930 3266 and give us the details.

SPECTRUM GAMES. Three fabulously original 16 48K experiences on one illustrated £3 cassette *Pyramid Panic* Beanstalk, Kong Fast multi-screen action Incredible Hi-res multi-colour graphics sound and music make this the best value quality games tape available Guaranteed Tim Boone 1 Mercury Close Southampton

LINE RUNNER for Dragon Fight a duel with the system beware of the time walls, loops and vortex Original arcade action Hi-res colour and sound Plus Super Breakout. Send £4 95 PO to D Goodchild 2 Ryders Avenue Westgate Kent.

BOGGLE. Nationally advertised as world's most addictive game Mind Boggler is superior Spectrum version with six skill levels and on screen recording £3 50 Bobker 29 Chadderton Drive Unsworth Bury Lancs

SUPERMAN Outlaw Missile Command and Nightdriver £40 secures, postage included Tel Towcester 52208 after 6 pm

Continued on page 5

★★ADVENTURE COMPETITION — WIN A 64★★



WINDOW ON ANOTHER WORLD
NEW RELEASES
STAR JAMMER — Wiping the sweat from my brow I searched the inky blackness ahead for signs of enemy fighters Through Star Jammer was the best ship in the galaxy my dwindling energy reserves made me doubt I could reach the next stargate (a one player space arcade game requiring one joystick)
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Dragon Rider £7 95 Tanks! £7 95 Games Comp B1 £9 95 Games Comp B3 £9 95 EDG Graphics (tape) £24 95 EDG Graphics (disc) £28 95
ORIC 1 Oric Trek £8 95 Games Comp 01 £7 95
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Salamander Software



26 May-1 June 1983 Vol 2 No 21



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Hobhouse Court 19 Whitcomb Street
London WC2 7HF
Telephone **01-839 6835**
Published by Sunshine Publications Ltd
Typesetting origination and printing by Chesham Press Chesham Bucks
Distributed by S M Distribution
London SW9 01-274 8611 Telex 261643

Subscriptions
You can have *Popular Computing Weekly* sent to your home
UK Addresses
26 issues £9 98
52 issues £19 95
Overseas Addresses
26 issues £18 70
52 issues £37 40

How to submit articles
Articles which are submitted for publication should not be more than 3 000 words long The articles and any accompanying programs should be original It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted

All submissions should be typed and a double space should be left between each line Please leave wide margins

Programs should whenever possible be computer printed

We cannot guarantee to return every submitted article or program so please keep a copy If you want to have your program returned you must include a stamped addressed envelope

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week

Editorial

The decision to hold a General Election on June 9 has resulted in the death of the Data Protection Bill With insufficient time left to pass the Bill before the dissolution of the present Parliament, the government decided to drop it

The Data Protection Bill, you may remember (*Popular Computing Weekly*, 31 March — 6 April), was bitterly opposed by a variety of groups including the British Medical Association and the Law Society

However, it looks likely that the Bill will be resurrected after the election if the Tories are re-elected

Opponents of the Bill are not against data protection legislation as such, but they are concerned that there should be adequate safeguards The old adage of garbage in/garbage out is particularly applicable If there are no checks on what goes into a computer, there will be few on what comes out

Perhaps there is a need for some sort of data protection ombudsman — an independent guardian conversant with the intricacies of computer records

Data protection is an extremely thorny subject, but it is one that will affect all of us The time to lobby the government for adequate safeguards is now — it will be too late once a new Bill has been passed

Next Thursday

See if you can avoid the aliens in this Invader's type action game, where you are the city bomber trying to keep clear of the flying anti-matter disc! New York — next week's Star Game for the 16K Spectrum by P. Watson.

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Compiler dispute

Continued from page 1

"If it is used in this way then the software house must reach agreement with us over a royalty payment This is individually negotiated with each software house concerned but is typically around five percent of the wholesale price

"We think that this is a small price to pay for the saving that the *Super C* program makes in terms of the time needed to create a machine-code program

Andrew Glaister

"If this is unacceptable, then the purchaser can send it back and we will refund the money

"Silversoft bought our compiler in December and used it to produce the *Slippery Sid* program, without negotiating a royalty payment with us.

"What they appear to be saying is that they don't agree with the idea of royalties on compilers "

Softek claims copyright has been infringed in the so-called run-time routines in the *Super C* program that are used in the *Slippery Sid* program Explained Tim "Our compiler is different from other compilers found on main-frame and mini-computers *Super C* produces a sort of mini-Rom Instead of calling routines from the Spectrum's Rom it uses its own — which actually form part of any program written using the compiler When a character is printed on the screen it is our run-time routine that does that "

Silversoft's David Patterson vigorously denys that any copyright has been infringed or contract breached in Softek's compiler Tim's main argument is that his compiler goes through a two-stage operation The main compiler takes the Basic source code and converts it into machine-executable code The second part of the program then executes it. He is claiming that because the executive code is an integral part of the program then we are in breach of his copyright That is like trying to sell a paint-brush without a handle.

"We have absolutely no intention of paying a royalty to Softek on each *Slippery Sid* tape sold, and if he wants a fight then he's picked the right company

"We bought his compiler by mail-order and there was no mention that Softek wanted to charge a royalty on programs developed using it in the mail-order advertisement — at the point of sale

David Patterson

"When you write a programming tool like a compiler you either keep it to yourself or put it in the public domain Trying to charge a royalty on programs written with it is laughable We have no intention of doing anything about his request for a royalty and if he wants to sling mud — let him go ahead "

● Andrew Glaister who wrote the *Super C* program for Softek, is a former Silversoft programmer He wrote *Orbiter* for them last year He receives 25 percent of any income gained by Softek on the *Super C* compiler, either through sales of the compiler itself or from royalties on programs written using it.

Across the pond

Continued from page 1

are equipped with an RS232 interface as standard.

Tony Clarke, Dragon's managing director explained the strategy for the US "Tano already sell an Apple compatible computer which they import from the Far East and they will use the dealer network set up for that product to sell the Dragons At the same time we will hope to expand the network to pick up a considerable number of new dealers "

Tano is based in New Orleans and began by manufacturing control systems for the oil, gas and shipping industries

Dragon has been looking for a suitable US manufacturer since the autumn of last year and the computer was first exhibited over there at the Comdex Fair in Atlanta this year

Design your own Forth micro!

POTENTIAL purchasers of a new Forth microcomputer are to be consulted over the final design of the machine

The new machine, as yet unnamed will be designed and manufactured by Remsoft and Advanced Test Systems

It will run Forth, be priced between £300 and £500 and the first prototypes should be working by the end of June The computer will be 6502-based with either 64K or 128 K Ram, 16K Forth 79 Standard Rom and an on-board disc operating system for Sony 3½ inch 70 track micro floppy disc drives

Other features are yet to be determined and will be decided by potential purchasers of the machine Advertisements will be placed in a variety of magazines inviting members of the public to fill out a questionnaire to help determine the final specification of the new machine It will probably have an RS232, Centronics and RGB outputs, have a bit-mapped screen display in eight colours and a second Rom port.

Remsoft already supplies a range of software for the Jupiter Ace Forth micro and plans to convert much of this material for the new machine in time for its launch later in the year A word processing package and database program are also planned.

Explained Paul Wynter of Advanced Test Systems "It is an experiment but, for the first time the public will play a part in the design of a machine they might buy

"The design is an up-rating of an existing 6502 board that we currently manufacture The exact form of that up-rating is still very much undecided — and what form it will take depends very much on the results from our questionnaire "

If you would like to take part in the survey then write for your questionnaire to Remsoft, Freepost, Brighton BN1 1ZW

Dragon drop their prices

DRAGON Data has cut the price of the Dragon 32 computer from £199 50 to £175

First to react was Boots who introduced the new pricing last week and other retailers are expected to follow

The price drop is recognised as a reaction to cost cutting two weeks ago of the Sinclair Spectrum machines Boots' merchandising controller, John Flatman, commented "It is a general trade price reduction which we think retains the correct price differential between the Dragon and the Spectrum "

Cyborg disc drive versions under way



CYBORG S 5¼ inch disc drive is now working with the ZX81 Spectrum and Oric computers and work is under way on versions for the Vic20, Commodore 64 and Dragon

The system's claim to fame is that the discs are transportable from machine to machine involving only a change of connector This is possible because the disc operating system is designed with its own 6500/12 processor on board and the operating system software need therefore not be compatible with the host micro (see Popular Computing Weekly *May 5)*

The system should go into production some time in late June

Low-cost networking

A LOW COST simple networking system for any machines that load from an ordinary cassette player is available from Network Computer Systems

The Multiload system makes use of a computer's Save and Load commands to direct programs from one machine to another

No facility is provided to protect against message collisions but a four-computer arrangement costs only £6 95 Additional connecting cable costs around 50p per metre

The system will only transfer information satisfactorily between computers of the same type, but will work with ZX81s Spectrums BBCs, Orics and Aces

Details from Sue Clarke Network Computer Systems 39 Bampton Road Luton Beds

Memory expansionboards for the BBCs

JOHN Richardson Computers plans a range of add-on memory expansion boards for the BBC microcomputer

The company will sell 64K and 128K boards which, just like a Ram pack, simply plug into the computer via the 1MHz bus

Although not addressable from the machine's Basic, the memory is seen by the computer as a 'book' of pages each containing 256 bytes Access to the pages is via machine-code *Peeks* and *Pokes* Just as with an array it is possible to *Peek* in and *Poke* out of the pages keeping track of the page number

The pages can be used to store data or sections of completed programs Four pages can be linked together to hold a single screen of information Such a technique could hold displays used in simple animation or perhaps locations in a graphics adventure

"The big limitation with the BBC machine " explained company founder, John Richardson, "is its memory The advantage of our system compared with loading information off discs is speed We can use a full 64K to store something like a mailing list or telephone directory in alphabetical order and get out data much quicker than is possible with a disc "

The 64K board should be available by the end of June and will cost around £140 The 128K board will follow at a price in the region of £175 More details from John Richardson Computers Ltd Unit 337, Walton Summit Bamber Bridge Preston, Lancs

Timex dispute at an end

THE sit in by 350 workers at the Timex plant, which had halted development work on the Sinclair Research flat-screen tv project, has ended

Normal working is due to be resumed this week bringing to an end a dispute which has lasted for more than six weeks Union officials of the AUEW and TASS have accepted an agreement involving 425 more job losses delayed for 90 days

Clive Sinclair commented that he was "absolutely delighted" that the dispute has been resolved

Now it's Ms Pac-Man!

IF you hoped you had seen the last of Atari's gobbling *Pac-Man* then you will be disappointed

Now the company is offering a follow-up — *Ms Pac-Man* Atari claims "this little lady is a screen sensation more dynamic and more talented than even *Pac-Man* himself"!

Ms Pac-Man is a cartridge for the Atari VCS and costs £29 99

Sinclair joystick option

THE Sinclair Research Rom cartridge adaptor (see *Popular Computing Weekly* May 19) will also operate as a joystick interface

The joystick port has been in the pipeline for some time Indeed some software packages from Psion — *Hungry Horace* for example — contain the necessary software hooks to run with the joystick

● There is still no sign of the Sinclair £40 microdrives — originally mooted over a year ago Although much of the development work is now complete, industry sources suggest that Norfolk-based DK'Tronics has been brought in to assist with the project

Argus cassette magazine

ARGUS Specialist Press, publisher of *Computer Today*, *ZX Computing* and *Micro Update*, is to launch the first magazine for computer users written entirely on cassette

The cassette magazine — *Spectrum Computing* — is for Spectrum owners and is compatible with both 16K and 48K models The first issue — May/June — contains over 80K of programs and software reviews presenting on-screen extracts from the games

Spectrum Computing will be published bi-monthly and will be available from W H Smith and John Menzies, price £2 99

Oric joins up with Cosmic in the Orient!

ORIC has formed a new company to manufacture and sell its computers in Japan and South East Asia

The new venture — Oric Japan — is half-owned by Oric Products and half-owned by a consortium including one of Oric's far east manufacturers and Cosmic, a Japanese retail chain

Oric's manufacturers are making the necessary changes to the machine to operate with Japan's NTSC television system and Oric are also developing software which will run using the Japanese Kana character set

Sales of the Oric computer in Japan are planned to commence in July

● It is also hoped that a version of the NTSC Oric will be produced by the same manufacturer for sale in the US

Microfairs to be held in June

THE beginning of June sees shows in London for both Sinclair and Commodore

The 7th ZX Microfair will be held at Alexandra Palace on Saturday June 4 Entry costs £1 and the fair will be open from 10 am to 6 pm

The 4th International Commodore Computer Show will be held at the Cunard International Hotel, Hammersmith from Thursday, June 9 to Saturday, June 11 Again, entry costs £1 and the show will be open from 10 am to 6 pm on Thursday and Friday and from 9 am to 5 pm on Saturday

Texas price reduction

Correction To take full advantage of Texas Instrument's special price deal for the 99/4A computer (see *PCW* May 19) it is necessary to buy a selection of software cartridges

To get a free Speech Synthesiser — worth £49 95 — or cassette recorder, you must also purchase six TI Rom software packs

Sensible solution?

I am writing to you on two subjects — the inevitable software library topic and the letter from Ashley Buss in your March 31 issue

Dealing with the latter first, may I suggest to your reader that he refers to the Dragon manual (p 17) for the easy method of listing programs, ie, pressing *Shift* and @ together to stop the list at any point and then pressing any key to continue

On the subject of software libraries, I find the attitude of certain manufacturers hard to accept I know that this is a young industry, but surely some sense must prevail soon

Instead of trying to fight the libraries, why do the manufacturers not enter into agreements with them? A similar situation to this happened in the video industry until the major companies realised that the market was primarily interested in renting tapes Consequently, instead of selling their tapes to dealers, the video companies entered into rental agreements

Now, I know that renting a film is not quite the same situation as renting software, but there are similarities It does not matter how good the software is there comes a time when its appeal wears off, and then what happens? It is swapped or sold to a friend — albeit illegally

I am a member of a software library, and I find its services invaluable I have, in the past, bought several tapes (up to £10 each) that were of disgraceful quality and on these occasions have felt somewhat cheated out of my hard-earned cash Bad software had in fact discouraged me from making purchases for some time

This is where the software library comes in If I obtain a poor program, I don't mind having wasted £1 50, and if I obtain a good program, I will support that company again in the future

One of the most interesting points is that I spend the same amount of money renting instead of buying Now, assuming that is the situation with everyone else, there must be the same amount of money going into the system Therefore, it is just a question of getting the distribution of this money right

There seem to be two alternatives Firstly, the manufacturers could rent libraries their tapes on a monthly basis instead of selling them Secondly, manufacturers could charge the libraries about 50p every time they lead a tape

I am sure that given a sensible arrangement the only people to suffer would be the manufacturers of poor quality software, and that would be no bad thing!

Iain Mackenzie
16 Dudley Drive
Glasgow G12 9SB

Who's to blame?

I feel I must reply to the letter from A J Prestwich (*Popular Computing Weekly*, April 28-May 4) concerning his trouble with obtaining his 32K expansion from ELR for his issue 1 Spectrum

I also own an issue 1 and have received and fitted an expansion from ELR, and I don't really believe ELR should take all the blame Sinclair has released more issue 1s than it has led people to believe and I will be very interested to see if Sinclair produces an expansion for it By the way, my expansion operates perfectly even after one stretch of eight hours non-stop use

PS I thought Clive Curry's Imagical Software letter was hilarious

G Bloomfield
Britannia
7 Edmund Close
Downend
Bristol BS16 5EJ

Free reign with railcards!

Hot on the heels of sensational revelations in certain magazines last week, concerning software houses and the cars their employees drive, Bug-Byte's co-director Tony Baden has let it be known that he is awaiting delivery of a Reliant Robin, complete with "GT stripe' Sales Manager John Phillips and Assistant Sales Manager Barbara Smathers share a 1973 Moskwich van and newly appointed creative and artwork head Les Harvey is believed to have ordered a Skoda Estelle. "Even though it's a bit flash," he says

The rest of the staff have unlimited access to all buses and trains "We allow them a free reign with their student railcards,' says Baden, ' And our UK Office Manager, Matthew Thomas, who I believe is 12, has his sister's bike " Baden hopes the news will not upset the company's customers. "I'd hate them to think we were wasting their money," he said

Stop Press Harvey distraught Estelle not available Yugo ordered

Matthew Thomas
Bug-Byte
100 The Albany
Old Hall Street
Liverpool L3 3AB

This letter follows a news item about Imagine Software and its new range of company cars in *Home Computing Weekly*, May 17-23. We are eagerly awaiting new developments in this Liverpudlian saga. Watch this space.

Extended life!

Users of microcomputers may have seen a parallel between computer software and what has been known as the "soul" of a person occupying the body's computer, the brain The conclusion may have been drawn that were it possible to somehow record the program from the brain, then immortality could result, if it could be played into a replacement body

Such science-fiction may well become fact, but not within the lifetimes of many of those now living However, some Americans have been exploring the ideas of cryonic suspension, where the bodies of deceased people are stored in liquid nitrogen until such time as the freezing damage, cause of death and ageing damage can be reversed.

Work is in progress to enable British people to take part in the cryonics program and the cost needn't be high within life, as long as sufficient assets are available upon death to pay for suspension and storage As you can t take them with you, the perceived financial loss if this unproven process doesn't work needn't be high An associated group is also working on ways to retard ageing now, and collates available scientific information as well as funding its own research It has achieved much publicity from appearances on US television and the publication of a best seller, *Life Extension – A Practical Scientific Approach* (Pearson & Shaw, Warner, $20, 1982)

I have been researching the cryonics and life extension programs and can send free details to anyone interested

John de Rivaz
West Town House
Porthtowan
Truro
Cornwall TR4 8AX

One Point Two

They do say that in a certain part of Cambridgeshire there is a creature strange called *One Point Two MOS* Tis affirmed twas borne of an Acorn by the Good Faine Beebeecee

If all tis said is true, *One Point Two* is a wondrous benevolent creature serving as page to many Roms, making men especial Word Wise It doth destroy the many tiny vermin in cassettes and renders sundry things possible

Time and again the wise men have joyously foretold the coming of *One Point Two* throughout the realm They look deeply into their crystal balls but often and sadly do turn away, their cash tills silent

I have conversed with travellers and those in far places demanding of them "what doth the creature resemble" Though many have heard tell of it I have met none who have yet seen it

Despairing then I will hie me hence to a monastery or a Sinclair or a Dragon or anywhere that reacheth specification Ere I go I must forewarn my family, friends and neighbours gainst th illusions of life and the Model B

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The software is extremely well and lucidly documented, and Gemini provide a full technical back-up and product up-date policy. Take a look at the information this program will provide:
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FINAL ACCOUNTS PROGRAM FOR BBC 32K, TORCH, SPECTRUM 48K.......£59.95
NEW
Requires Cash Book module. This program will take your cash book data to the logical conclusion of balance sheet, trading and profit/loss account and notes to the accounts i.e. fixed assets, land and buildings and capital accounts. Final accounts (BBC version) links to 'Beebplot' for graphic data presentation.
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(WHICH MICRO AND SOFTWARE REVIEW)
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Compatible with most micros. See table. Ideal for the small business. A complete suite of programs together with generated customer file for producing crisp and efficient business invoices and monthly statements on your line printer. All calculations include VAT automatically, and the program allows your own messages on the form produced. This program gives you superb presentation and saves time on one of the most tedious tasks in the office.
COMMERCIAL ACCOUNTS...£19.95
Compatible with most micros. See table. A gem of a program, all for cassette, with the following features: Daily Journal, Credit Sales, Cash Sales, Credit Purchases, Purchases – other, Sales Ledger, Purchase Ledger, Bank Account, Year to date summary. A fully interactive program suitable for all businesses. Files can be saved and loaded and totals from one file carried forward to another on cassette. Particularly useful from a cash flow point of view, with an immediate accessibility to totals for debtors and creditors. Bank totally supported with entries for cheque numbers, credits and, of course, running balance.
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Compatible with most micros. See table. A superb dedicated database to allow for manipulations of names and addresses and other data. Gemini's unique 'searchkey' system gives you a further ten 'user-defined parameters' to make your own selections. Features include the facility to find a name or detail when only part of the detail is known. It will print labels in a variety of user specified formats.
DATABASE...£19.95
Compatible with most micros. See table. The program that everyone needs, the most valuable and versatile in your collection. Facilities include sort, search, list, print if required. Can be used in place of any card index application. Once purchased you can write your own dedicated database to suit your particular needs with a limitless number of entries on separate cassettes.
STOCK CONTROL...£19.95
Compatible with most micros. See table. Dedicated software with all that's necessary to keep control of stock. This program will take the tedium out of stock control and save time and money. Routines include stock set up, user reference number, minimum stock level, financial summary, line print records, quick stock summary, add stock, delete/change record and more.
HOME ACCOUNTS...£19.95
Compatible with most micros. See table. Runs a complete home finance package for you with every facility necessary for keeping a track of regular and other expenses, bank account, mortgage, H.P., etc. This program also allows you to plot graphically by Histograms your monthly outgoings.
WORD PROCESSOR...£19.95
Compatible with most micros. See table. This program features routines found in much larger and more expensive packages. With a typical word length of 5-6 letters it allows for around 1000 words in memory at one time. Ideal for the user who requires a simple program to write letters on his computer. Features include, block delete, block insert, search and replace, edit text, display text and more.
"Simple to use ...."
"Ideally suited to the way most offices run....."
PERSONAL COMPUTER NEWS

...ms for more computers!

SPREADSHEET ANALYSIS
BEEBCALC £19.95
DRAGONCALC £19.95

NEW

FOR BBC AND DRAGON 32 Spreadsheet processors have proved to be important tools for using micros in business scientific and domestic financial applications.

```
POSITION   AI    BC          SPACE    5185        T
           2I    A              II    B     II    C     II
1       -J.B. SNOOKER T/A POT-BLACK
2        PROJECTED CASH FLOW           YEAR        ENDED
3
4                                      Oct.        Nov
5                                      £           £
6        INCOME
7        Sales                         11700       10944
8
9
10       REVENUE EXPENDITURE
11       Purchases                     200         500
12       Advertising                   500         1200
13       Director's salary             1590        1596
14       Salaries                      2216        2216
15       Rent
16       Telephone                                 200
17       Insurance                                 200
18       Printing, stationery                      500
19       Repairs & renewals
05       Hire of equipment             60          60
COMMAND BCDEFGPRSTW"?
```

Without any programming knowledge at all, you may
- Set up a computerised spreadsheet, with chosen row and column names.
- Specify formulae relating any row or column to any other
- Enter your source data and have the results calculated.
- Save the results on tape (or disk – BBC) for later reloading and manipulation
- Print the tabulated results in an elegant report format.
- Experienced users may access saved files and write their own reporting or graphics presentation programs for the results.

Some typical applications –
- Small business accounting applications e.g. profit and loss statements and cashflow projections break-even analyses etc
- Investment project appraisal – anything from double glazing to oil rigs!
- Comparing rent/lease/buy options.
- Processing the results of scientific experiments or field studies.
- Engineering calculation models
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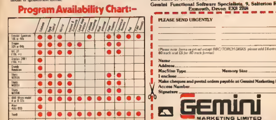
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VIC 20 (16k +)	●	●	●	●				●	●		
Sinclair ZX81 (16k +)	●										
[illegible]	●										
Sharp MZ80A	●	●	●	●				●	●		
Sharp [illegible]	●	●	●	●				●	●		
Sharp [illegible]	●	●	●	●				●	●		
BBC Micro model A or B 32k	●	●	●	●	●	●	●	●	●	●	●
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Epson HX 20	●										
Commodore 64	●										

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Depth Charge

A new game for the Vic20 by Robert Irvine

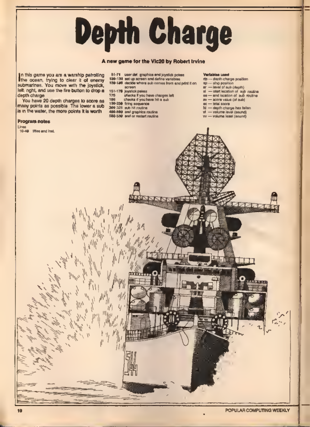
In this game you are a warship patrolling the ocean, trying to clear it of enemy submarines. You move with the joystick, left, right, and use the fire button to drop a depth charge.

You have 20 depth charges to score as many points as possible. The lower a sub is in the water, the more points it is worth.

Program notes

Lines
10-49 titles and inst.
51-71 user def. graphics and joystick pokes
130-138 set up screen and define variables
139-148 decide where sub comes from and print it on screen
151-179 joystick pokes
175 checks if you have charges left
186 checks if you have hit a sub
139-230 firing sequence
300-325 sub hit routine
400-500 end graphics routine
500-539 end or restart routine

Variables used
dp — depth charge position
sp — ship position
sr — level of sub (depth)
sl — start location of sub routine
se — end location of sub routine
sv — score value (of sub)
sc — total score
fd — depth charge has fallen
vl — volume level (sound)
vv — volume level (sound)



```
READY.

10 PRINT"":"     DEPTH CHARGE"
15 PRINT"BY ROBERT IRVINE (C)"
20 PRINT "YOU CONTROL THE SHIP,"
25 PRINT "TRY TO 'DEPTH CHARGE'":PRINT "THE SUBMARINES THAT"
26 PRINT"MOVE BENEATH YOU."
27 PRINT"YOU HAVE 30 CHARGES.":PRINT"THE LOWER THE SCORE":PRINT"MORE POINTS
"
30 PRINT"GOOD LUCK!!"
35 PRINT "PRESS ANY KEY TO START"
40 GETPR$:IFPR$=""THEN40
51 POKE36876,220
55 FORV=7168TO7168+71:READJT:POKEV,JT:NEXTV
61 DATA0 0,0,0,0,0,0,0
62 DATA4,4,63,15,255,100,63,31
63 DATA128,128,240,224,225,255,254,252
64 DATA0,0,0,0,14,255,111,63
65 DATA64,224,236,232,239,255,246,232
66 DATA0,0,40,124,40,0,0,0
67 DATA255,255,255,255,255,255,255,255,168,140,74,170,53,218,74,89
68 DATA16,56,56,16,16,56,16,40
69 POKE36869,255:F=0:FD=22:DP=0:M=0:SC=0:DL=20
71 POKE37151,0:PA=37151:PB=37152:RB=37156
100 REM SET UP SCREEN
105 POKE36879,238:PRINT""
110 FORJK=7480TO8185:POKEJK,0:NEXTJK
115 FORHN=38510TO38510+22:POKEHN,0:NEXTHN
116 FORLM=38532TO38905:POKELM,6:NEXTLM
120 PRINT""
125 SP=7800
126 POKESP,1:POKESP+1,2
130 REM MOVE SUB
131 SR=INT(RND(1)*8):IFSR=<1ORSR>=8THEN130:SE=0:SL=0:K=0:U=0:Q=0:SG=0
132 VV=15
133 IFSR=2THENSL=8142:K=1:U=1:Q=1:SG=20:SV=15:GOTO146
134 IFSR=3THENSL=8052:K=-1:U=1:Q=-2:SG=-20:SV=10:GOTO146
135 IFSR=4THENSL=7922:Q=1:U=1:K=1:SG=20:SV=5:GOTO146
136 IFSR=5THENSL=8162:K=-1:U=1:Q=-2:SG=-20:SV=15:GOTO146
137 IFSR=6THENSL=8032:Q=1:U=1:K=1:SG=20:SV=10:GOTO146
138 IFSR=7THENSL=7942:K=-1:U=1:Q=-2:SG=-20:SV=5:GOTO146
140 REM PINT SR
146 SE=SL+SG
147 IFSL<>SETHENSL=SL+K:POKESL,3:POKESL+U,4:POKESL-Q,0
148 IFVV>0THENVV=VV-1
149 POKE36878,VV:IFSL=SETHENPOKESL,0:POKESL+U,0:POKE36878,0:GOTO131
150 PRINT"SCORE"SC:PRINT"CHARGES LEFT DL"
151 A=PEEK(PA):POKERB,127:B=PEEK(PB):POKERB,255
153 IF(BAND128)=0ANDF<>1ANDSP<7810THENSP=SP+1:POKESP,1:POKESP+1,2:POKESP-1,0
160 IF(AAND16)=0ANDF<>1ANDSP>7790THENSP=SP-1:POKESP,1:POKESP+1,2:POKESP+2,0
170 IF(AAND32)=0ANDDL>0THENF=1
175 IFDL=0THENGOTO400
180 IFF<>1THENGOTO147
185 DP=SP+FD+1
186 IFPEEK(DP)<>0ANDPEEK(DP)<>5THENGOTO300
190 POKEDP,5:IFM>0THENPOKEDP-22,0
210 M=M+1:FD=FD+22
220 IFM=17THENDL=DL-1:POKEDP,0:F=0:FD=22:M=0:DP=0:GOTO230
230 GOTO147
300 POKEDP-22,0:POKEDP+1,7:POKEDP-1,7:POKEDP,7
310 POKE36876,0:POKE36877,220:FORL=15TO0STEP-1:POKE36878,L
315 FORLL=1TO100:NEXTLL:NEXTL:POKE36877,0:POKE36876,220
320 POKEDP,0:POKEDP+1,0:POKEDP-1,0
325 M=17:SC=SC+SV:SL=SE:GOTO220
400 POKE36878,0:POKE36876,0:POKE36877,120:VL=0
405 POKESL,0:POKESL+1,0:POKESL-1,0
410 POKESP,0:POKESP+1,0:POKESP-1,0
420 POKE7000,1:POKE7001,2
430 POKE8152,3:POKE8153,4
440 FORPM=8131TO7023STEP-22:VL=VL+1
445 POKEPM,8:IFPM+22<>8153THENPOKEPM+22,0:POKE36878,VL
446 FORTJ=1TO100:NEXTTJ
450 NEXTPM
455 POKE7000,7:POKE7001,7:POKEPM+22,0
460 POKE36877,220
465 FORGU=15TO0STEP-1:POKE36878,GU
470 FORHJ=1TO150:NEXTHJ
480 NEXTGU
485 POKE7000,0:POKE7001,0:FY=0
490 POKE36878,0:POKE36877,0:POKE36876,230
495 VL=15:FORDB=8152TO8184:POKEDB,3:POKEDB+1,4:POKEDB-1,0:POKE36878,VL:VL=VL-0.
75
496 IFVL=0THENVL=15
497 FORT=1TO50:NEXTT
498 NEXTDB
499 POKEDB,0:POKEDB-1,0
500 POKE36876,0:POKE36878,0:POKE36869,240:POKE36879,27:PRINT""
505 PRINT "YOU WERE ELIMINATED":PRINT"WITH A SCORE OF"SC"."
510 PRINT "ANOTHER GAME (Y/N)"
515 GETXX$:IFXX$=""THEN515
520 IFXX$="Y"THEN530
525 PRINT "":END
530 RESTORE:CLR:GOTO51
```

Programs for programs

***Tony Bridge** looks at the growing range of utilities for the ZX Spectrum*

The vast majority of those people now buying home computers do so, apparently to play games Walk into the average software store, and the assistant will almost certainly ask you, "Which game would you like Sir/Madam?"

But surely, sooner or later, the squeaks and explosions of the Invaders and Scramblers and hungry little Pacmen must pall for many people It is then that the more serious programs come into their own

The Sinclair Spectrum is particularly well-served in this area as a well-trodden path for the Hobbyist has been forged from the ZX80, to the ZX81, and on to the Spectrum The beauty of the Sinclair range is the excellent selection of software readily available for light relief, and the sheer — sorry about the jargon — "friendliness" of the machines

So in this review we shall take a look at some of the Utility programs — programs that make it easier for you to make your own programs work. In addition we'll look at Business Utilities — programs that make it easier for you to make your (small) business work.

Programming is a rather esoteric art, shrouded in mystery to the uninitiated But it is rapidly becoming clearer to many people, as they take the plunge into the murky waters

To the serious programmer a Toolkit is a necessity Workforce, run by Derek Tidman has a number of programs which will be of interest *Programmers Dream* (or *PD*, author Dr Robert Rayment), is loaded before work starts, and includes several useful features *Renumber* is a powerful facility which renumbers your fledgling program from any start point, in any step size to any finish point. All *Gotos*, *Gosubs*, *Restores*, etc, which will be affected are taken care of along with the renumbering

Block Move is a similar facility, allowing the programmer to move a whole chunk of lines to another place within the listing renumbering being handled along the way *Erase* will do just that to any number of lines — but beware *Gotos* and *Gosubs* are not handled by this command (but this shouldn't be a problem — the program would, on Run go on to the next line after a *Goto* to a non-existant line)

Change String will change either every occurrence of a string or selected occurrences *Dump* (strange name) prints on the screen the variable names and values Finally, but not leastly the size of your program together with the variables can be inspected All this is pretty standard fare for Toolkits, and contains nothing new, but Dr Rayment has written a very compact program (just 1450 bytes) which, along with the comprehensive documentation, is an absolute gem The program is very easy to use — just *Clear* space above Ramtop, and then begin working on your own program *PD* will be ready when needed.

Another compact little beauty from Dr Rayment and Workforce is the *Spectrum Disassembler*, which allows you to peek at the secrets of your machine code programs The screen display contains on the left, the address, and in the centre the code of the bytes at that address On the right is the mnemonic associated with the code As you enter your machine code program, the *Disassembler* will translate the bytes into mnemonics for your inspection. The program is well-documented, and assumes the user to be completely familiar with machine-coding techniques

As an introduction it is very useful

The final Utility from Workforce is *Display* a character generator, written by Gloster Software Now there are many CGs on the market all pretty much the same though each has its own attractive points — all Spectrum owners will already have a good one on the Horizon tape from Psion, and of course this one is free with the computer Good value for money!

However the tape from Gloster/Workforce is a different proposition entirely As you will know, the Spectrum supports 21 User-Defined Graphics (UDGs) in addition to the 96 standard characters — *Display* will provide you with a massive 273 extra shapes (on the 16K machine) or 336 shapes on the 48K machine To put it another way the normal 21 UDGs allowed by the Spectrum may be held in sets of "pages" in memory and called up as needed — 16K will hold 13 pages and 48K will hold 16 pages *Display* enables you to show all these pages on-screen at the same time

A demo program is *Loaded* first This consists of a title page, the text of which is set out in characters of 64 (to the line) width Around the introductory text is arrayed a large number of UDGs any of which may be set into animated motion at the touch of a key You will see for example a rocket taking off rifles shooting at a poor little bird jugglers, munching Pacmen dancers, spinning wheels and many more

The main program follows on the tape Once this is *Loaded* a work space is displayed along with a display "sheet"

Now is the time to *Load* into this space any characters you may have previously created, should you wish to work on them Following the main program are several "pages containing the characters from which the demo title page was built — you are advised to *Load* these and use them to gain insight into the workings of *Display*

The Basic method to amend characters is *Pick* from the display "sheet" or (if you are creating your own) *Fetch* a standard character from the Spectrum's keyboard and move the character to the work space Now the character may be *Turned* clockwise or anti-clockwise by ¼ or ½ turns

You may also *Invert* (or flip over) the character, *Reverse* back-to-front *Expand* the character (so that any quarter will fill the whole square), and finally *Shift* the whole thing by one pixel at a time to the left, right up or down During this procedure, any of the pixels within the character square may be turned on or off Finally, your amended or newly-created shape may be returned to the display sheet, ready for eventual *Saving* to tape

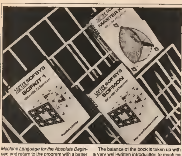
By typing *Help*, a page of options is presented, and this along with the usual good Workforce documentation, ensures that the user is never left helpless Advice on creating animated graphics is included, and all in all, it is hard to imagine a more useful UDG-generating aid than this

Another machine code programming aid has been published by Oxford Computer Publishing Ltd Written by F O Ainley the *Machine Code Test Tool* comes nicely packaged in a shiny sturdy box slightly smaller in size than a paperback The accompanying manual is described as a Tutorial in machine code, and fulfills this function quite well A 32-page booklet cannot enter into quite as much detail as a full-blown book on the subject but as an introduction it is very useful

Your best course is to work through a book such as William Teng's *Spectrum*

continued over the page





Machine Language for the Absolute Beginner, and return to the program with a better knowledge of the jargon and techniques of machine code programming. Write an exploratory program and use the *Test Tool* to run and debug your attempt. The contents of all the registers will be displayed for you to inspect and change as necessary.

As a bonus a Character Generator (yes another one!) is included on the reverse side of the cassette — it's fairly standard with no surprises but it's nice to get a little gift isn't it?

Spectrum Machine Language for the Absolute Beginner is just one of many books now on the market (there'll be more!) all attempting to instruct the Spectrum user in the delights of machine coding. This book is one of the best I have seen on the subject — for once the title is on the nose! I can recommend this to anyone just getting interested.

The only quibble I have with the book is the amount of spelling mistakes — there is at least one per page, and the Great Spelling Mistake Hunt eventually become a major entertainment. Fortunately, this does not detract from the work as a whole, and only becomes a nuisance when a missing page throws the reader into momentary confusion.

A cassette is also available, containing some of the programs from the book.

While on the subject of cassettes that come with books let me mention once again Trevor Toms' *Spectrum Pocket Book*, which I spoke of briefly some weeks ago. Half of the book consists of the usual games listings though for a change these are original and actually quite good. They also of course contain a lot of useful routines for the reader's own games. And incidentally the line by line documentation of the program is exemplary.

The balance of the book is taken up with a very well-written introduction to machine code techniques.

A cassette is available for the games, and another for the machine code part of the book. Amongst other goodies on the second tape is a Screen Toolkit which is a routine for scrolling up, down, left and right, as well as printing to any pixel.

Another system, recently released is *Sofsys*, from Softek, Tim Langdell's company. The full system consists of five programs — to take full advantage of them they should be *Loaded* into memory together. However they maybe used individually.

Before work is begun, the heart of the system *Masterkey*, should be *Loaded*. With the aid of this program up to seven keys may be defined by the programmer. *Masterkey* comes with five keys predefined, which may be edited to suit the user's requirements. As they stand, they control, with one key-touch, entry of the Assembler which is another part of the system, entry of the Disassembler and the operation of the Compiler.

Softek, confusingly, has another name for this program, *Sofime* which hints at its other facility, a clock.

With *Masterkey* in memory, *Sofkit 1*, a programming toolkit maybe *Loaded*. This is a fairly straightforward toolkit — like many others, it enables the use to *Renumber* (with all *Gotos, Gosubs* and so on), *Erase* all *Rem* statements (thus saving memory), and examine the length of program and variables at any time. The program will also change upper case characters into lower, and vice-versa.

Probably the most important and unusual feature for a program at this price and this computer, is the *Trace* facility. Run the program through, and you'll see the line number and statement currently being processed. Thus, if the program hangs up, the bug can be *Traced* very easily.

Sofkit 1 like some of the other parts of *Sofsys* has been written by Andrew Glaister the author of several bael-selling games for the Spectrum.

The next element of *Sofsys* is *Sofmon* (look, I didn't dream up these names!), the Disassembler/Monitor of the system. There are two versions, one for each of the memory sizes, but the facilities are the same in either case. Each command maybe accessed by one keystroke, thus, at one stroke relieving you of the need to buy *Masterkey*.

As will all the other parts of *Sofsys* the documentation is precise and clear, guiding the user effortlessly through the highways and byways of the Utility. Twenty-five functions in all are available including, in the Monitor section *Erasing* or *Inserting* bytes in memory, decimal to Hex conversion, and vice-verse. *Moving* areas of memory, finding a series of bytes and so on.

Probably the most intriguing part of the whole *Sofsys* package however and one that Softek obviously regard as the flagship of the system is the Compiler or *Super C*, as Softek couldn't refrain from calling it!

A number of things the Super C can't handle

Super C comes well-packaged in a large box that opens like a book to reveal the cassette nestling inside along with a 22-page instruction manual. The cover artwork shows for some strange reason a futuristic starship pilot fixing the viewer with an icy stare. Reflected in his visor is a — well, probably a Betelgeusian Battlecruiser! And just when you thought it was safe to go back to the Spectrum! Eye-catching however, which is the object of the exercise.

The Compiler converts more or less

instantly, your Basic program into machine code, thus endowing the program with all the benefits of machine code. Three small programs are included in the package, which demonstrate the point admirably. A screen printing routine is followed by a count from 0 to 1,000, and in both cases, the compiled program is orders of magnitude faster.

The most impressive demonstration is the third, a very simple *Invaders* program. In Basic it is very slow, and you wouldn't want to play it for more than a few seconds. When compiled, the program becomes very much faster, and the game is at least bearable for a couple of minutes.

Down to the operation now — and it's all clearly explained in the manual. If *Masterkey* has been *Loaded*, a key can be defined to handle the compiling command, but that's very quick to type anyway. Just *Load* your Basic program, and then simply key *Randomise Usr* 49152 — a fraction of a second later, the program is in machine code!

Sounds simple, doesn't it? Well, it is, but don't get the idea that you can write anything in Basic and have it compiled for you. There are a number of things that *Super C* will not handle, and which necessitate extra thought when writing your original program.

First, variables can only be upper case (capital) characters, and you are only allowed to define 26 of them — A to Z. A second example is *Gotos, Gosubs* and *Returns*. These must all refer to an existing line, no more jumping to a vague line number and letting the computer find the next relevant line. *Super C* will not, moreover, recognise a calculated line number (so you cannot say *Goto 20*score*).

A stand that is morally indefensible

A final example here, although there are several more in the manual, is the restriction on local colour commands. You'll be used, in Sinclair Basic, to putting *Over, Inverse, Ink, Paper,* and so on within *Print* statements — these will not affect the rest of the screen or program. These will not be compiled by *Super C*. You will have to set the parameters globally, and then reset after the *Print* statement.

However, the most serious drawback in *Super C's* facilities is that it will not compile statements involving fixed-point arithmetic, and will not allow string-handling statements! An enhancement package will, says Softek, be available soon to enable the programmer to use these facilities in his Basic program.

I don't know if Softek intends to give the package to existing customers or will charge extra for them, but I think a program calling itself a Compiler should certainly include these facilities.

The total *Solsys* package can be recommended, and the Compiler, in particular, though expensive at £15, is — with the caveat of the lack of some important facilities — worth every penny.

One final doubt nags me, however, and that is about the copyright notice at the beginning of *Super C's* manual. I've deliberately left this point out of my appraisal until now — it will only affect you if you intend to market your compiled program. Softek is very concerned that as such programs must contain some of *Super C's* routines, the company must ask you for a royalty. I think this stand is, morally at least, indefensible. There are many compilers in use much higher up the computing scale, at the minicomputer and mainframe level. Royalties are not sought by the original manufacturers of these programs unless the actual compiler itself is passed on to a third party as part of a total package.

Legally, of course, Softex are entitled to ask whatever they desire — and *Solsys* remains as a most important suite of programs for the programmer. ■

Firm	Program	Cost
Workforce 140 Wilsden Avenue Luton Beds	*Programmers Dream* *Display* *Spectrum Disassembler*	£6.95 £7.00
Oxford Computer Publishing Ltd PO Box 99 Oxford	*Machine Code Test Tool*	£9.99
Melbourne House Glebe Cottage Station Road Cheddington Leighton Buzzard Beds	*Spectrum Machine Language for the Absolute Beginner*	£6.95
Phipps Associates 99 East Street Epsom Surrey KT17 1EA	*Spectrum Pocket*	6.50
Softek 329 Croxted Road London	*Masterkey* *Softkit* *Solmon* *Super C*	£7.99 £7.99 £7.99 £14.95



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Clearly labelled!

***R Luxton** explains how to make your own labels on the 16K ZX81*

Label Maker is a routine for the 16K ZX81 to print your own personal label at the head of any program. It can take the form of a "copyright" mark, a special instructions panel, a fancy nameplate or whatever you want. It is designed to be *Poked* above Ramtop so that it can be quickly added to any existing program.

First, type in the listing in Fig 1 starting with *1 Rem* and exactly 122 full stops (enter as a direct command "*Print(Peek 16511)-2*" to check that you have the right number) and then *Save* the program before Running. Next, clear the ZX81 by switching off for three seconds or so, and then switch on again. Enter as direct commands, "*Poke 16388 133*", "*Poke 16389,127*" and "*New*" then *Load* and Run the routine.

You will be asked to enter your program title, and then the copyright line, after which the screen will go blank for a few seconds, and will then *List* showing your label in *1 Rem*. If the label is correct just enter *Goto 600* and *Newline*. If not then enter *Goto 20* and *Newline* and enter it again. When the label is right, enter *Goto 600* and *Newline* and the computer will *Poke* your label above Ramtop.

Now *Load* the program on which the label is to appear and add a *1 Rem* with exactly 122 full stops, and the lines in Fig 2, preferably at the end of the program. Then enter *Goto 9000* and the label will be down-loaded from above Ramtop to the head of your program. Also enter as a direct command "*Poke 16510 0*" to change the line from 1 to 0, where it is safe from accidental erasure.

The program will not Run in the usual way, although Run will still clear the variables. You should start your program by "*Goto* (the second line)" or "*Run* (second line)", if the variables need resetting.

As an extra, add lines 8999 and 9025 (Fig 3) and then enter as a direct command "*Print A$*" after you have down-loaded your label. It will then be in *A$* as well as at the head of your program. This is very useful for calling from anywhere throughout the program as a natural break or just as a piece of advertising. Or just enter "*Lprint A$*" for the printer to produce a convenient sized label for sticking to cassettes or cassette cases. ■

Fig 1 Label Maker

```
   1 REM ..........................................
........................................................
........................................................
...
  20 FAST
  30 REM =============
  40 REM INPUT TITLES
  50 REM =============
  60 PRINT "ENTER PROGRAM TITLE"
,"(MAX 25 CHARACTERS)"
  70 INPUT A$
  80 IF LEN A$>25 THEN GOTO 70
  90 PRINT
 100 PRINT "ENTER COPYRIGHT LINE
","(MAX 28 CHARACTERS)"
 110 INPUT B$
 120 IF LEN B$>28 THEN GOTO 110
 130 REM ===============
 140 REM SET-UP GRAPHICS
 150 REM ===============
 160 LET A=137
 170 FOR I=16513 TO 16635
 180 IF I=16540 THEN LET A=135
 190 IF I=16604 THEN LET A=133
 200 POKE I,A
 210 NEXT I
 220 LET A=133
 230 FOR I=16515 TO 16602 STEP 3
2
 240 POKE I,A
 250 NEXT I
 260 LET A=5
 270 FOR I=16539 TO 16626 STEP 3
2
 280 POKE I,A
 290 NEXT I
 300 LET A=8
 310 FOR I=16540 TO 16608
 320 IF I=16548 THEN LET I=16572
 330 IF I=16577 THEN LET I=16604
 340 POKE I,A
 350 NEXT I
 360 REM ===============
 370 REM POKE IN TITLES
 380 REM ===============
 390 LET C=1
 400 LET Z=INT ((26-LEN A$)/2)
 410 FOR I=16546+Z TO 16545+Z+LE
N A$
 420 POKE I,CODE A$(C)
 430 LET C=C+1
 440 IF C>LEN A$ THEN GOTO 460
 450 NEXT I
 460 LET C=1
 470 LET Z=INT ((26-LEN B$)/2)
 480 FOR I=16578+Z TO 16578+Z+LE
N B$
 490 POKE I,CODE B$(C)
 500 LET C=C+1
 510 IF C>LEN B$ THEN GOTO 530
 520 NEXT I
 530 CLS
 540 GOTO 560
 550 STOP
 560 PRINT "IF LINE 1 IS OK,",,"E
NTER GOTO 600 AND NEWLINE.",,"IF
NOT,",,"ENTER GOTO 20 AND TRY AG
AIN."
 570 PRINT
 580 PRINT
 585 PRINT
 590 LIST
 600 LET A=16513
 610 FOR I=32645 TO 32767
 620 POKE I,PEEK A
 630 LET A=A+1
 640 NEXT I
1000 REM ======================
1010 REM REMOVE WHOLE PROGRAM
1020 REM ======================
1030 NEW
2000 SAVE "LABEL MAKE█"
2010 RUN
```

Fig 2

```
   1 REM ..........................
........................................
........................................
........................................
9000 LET A=32645
9010 FOR I=16513 TO 16635
9020 POKE I,PEEK A
9030 LET A=A+1
9040 NEXT I
```

Fig 3

```
8999 DIM A$(123)
9025 LET A$(I-16512)=CHR$
PEEK A
```

Examples of labels

```
ZX81 LABEL MAKER
(C) 1983 R.G.LUXTON
```

```
DO NOT ENTER *RUN*
TO START ENTER *GOTO 10*
```

The Pit — part two

***Paul Sellin** presents part 2 of* The Pit *— a text adventure for the 16K Spectrum*

This week, having initialised the arrays and variables to start the game, we shall look at one of the most important elements in an adventure game — the monster.

Lines 3015 to 3075 contain the monster routine, with the data being stored in line 3100. The routine is really very simple once the monster has been chosen from the data, either it attacks you (lines 3030 to 3035) or you attack it (line 3025) or you retreat.

If you are still 'alive' after the monster has attacked you, then the program moves on to the attacking the monster sequence. If the monster survives, which is checked at the end of line 3035, then the program jumps back to line 3025 and puts you under attack again!

On entering the monster routine, the computer must randomly select which monster to present. This occurs in line 3015 — by looping a random number of times, each time reading a set of data, the current data after the last loop becomes the chosen monster.

Line 3100 contains five pieces of data for each monster: first its name, which is a string and is assigned to p$, then four variables representing in turn its strength, psi power dexterity and intelligence, each in the range 0 to 20. These are assigned to the four variables st, ps, de and in. Notice how the monster's variables differ from the player's variables of s, p, d and i.

If you survive the monster's attack, then you have the chance to fight back. Depending on your dexterity, the computer allows you a certain amount of time in which to attack — if the time runs out, then the monster attacks again.

The computer allows you to attack in one of three ways: either by casting a spell (key s), by giving it a thought problem (key t), or by just attacking normally (any other key except r). Pressing the r key allows you to retreat.

The spell routine is in lines 3050 and 3055. It prints up a suitably fiendish spell and then calculates its effects by comparing the variables p and ps. If the monster dies then the whole monster routine is exited via line 3040; if not, then the monster attacks again with the program jumping to line 3025.

The 'thought' routine works in a similar way in lines 3060 to 3070. The computer

```
2530 DATA "a potion of sight","c
hokang gas!!","Flash!, an expl
osion!","an old skeleton","a set
 of bonuses!","nothing","a set o
f bonuses!","nothang"
2540 IF x$( TO 2)="Fl" THEN LET
si=0: GO TO 8500
2545 IF x$( TO 2)="ch" THEN PRIN
T "It weakens you..." LET d=INT
 (d-RND*8) LET i=INT (i-RND*8).
 LET s=INT (s-RND*5). GO TO 8000
2550 IF x$( TO 3)="a p" THEN PRI
NT '"You boost your powers of si
ght."'' LET si=1: GO TO 1000
2560 GO TO 1000
2705 IF NOT si OR NOT fl THEN GO
 TO 8500
2710 IF y<2 OR x<2 OR y>9 OR x>1
9 THEN PRINT ''"No flares here,
dear creature..."'' BEEP .2,-12
. GO TO 1000
2715. CLS . PRINT ''"Here goes wi
th one precious     flare..."'.
FOR f=y-1 TO y+1 PRINT TAB 12,
PAPER 2," ", FOR e=x-1 TO x+1.
PRINT INK 7, PAPER 2,a$(z,f,e),"
 ", NEXT e. PRINT " ": NEXT f. P
RINT AT 5,15,"+", INK 0 LET fl=
fl-1. PRINT ''' GO TO 1000
2720 GO TO 1000
2800 PRINT "Oh dear!''- You ve f
ound a Time Warp...". LET z=1+IN
T (RND*3). LET x=1+INT (RND*19).
 LET y=1+INT (RND*9). FOR h=35 T
O -10 STEP -1. BEEP .05,h: NEXT
h. PRINT '"You are now at Level
",z'"At position ",x,",",y''. GO
 TO 8000
2900 LET e=1+INT (RND*9). LET fl
=fl+e PRINT "You found ",e," fl
ares." LET a$(z,y,x)=" ". GO TO
 8000
3010 RESTORE 3100 FOR f=1 TO IN
T (1.5+RND*7): READ p$,st,ps,de,
in NEXT f. PRINT "You have foun
d ";p$,'''"Status Report."'"Stre
ngth",st'"Psi Power",ps'"Dexteri
ty",de'"Intelligence",in: FOR f=
1 TO 300. NEXT f. IF d-de>0 THEN
 IF 6*RND*d>de*2 THEN GO TO 3030
```

generates a random multiplication sum in line 3065 — the accuracy of the monster's 'answer' is dependent on *in*, its intelligence, plus a random factor.

There are a few little extras, such as you not being allowed to 'think' if *i* is less than 10, whereupon you will immediately be attacked again. Also, a stupid monster, where *in* equals zero, will ignore your sums and proceed to attack regardless.

'Retreating' is contained in line 3033 which just prints up a suitable message and exits the monster routine to line 8000. But your strength is reduced significantly if you retreat from a weak monster.

Normal attacking revolves around line 3035 which calculates the monster's damage and subtracts it from its strength. If *st* is still greater than zero, then the monster attacks you again with the program jumping back to line 3025.

On killing the monster and reaching line 3040, your *ps* power is increased according to that of the monster. The *m* character in the main array is replaced by a space, ensuring that the monster really is dead. If you kill the *Warlord*, which is the strongest monster of them all, then you could pick up treasure if the program jumps to the 'treasure' routine in line 2000.

On leaving the monster routine in line 3045 the program jumps to line 8000. This is just one big multi statement line, which prints out all the variables and strings of the player. *Poking* 23692 just line the screen scroll automatically. This routine then jumps back to the main loop at line 1000.

A couple of other useful blocks of program are those which give the player his 'eyes'. These are the 'flare' routine (lines 2700 to 2715) and the 'map' routine (lines 9201 and 9220). Both are accessed directly during the game by pressing keys *f* or *m* respectively (lines 1003 and 1004). If you are blind and *si* equals zero then both routines will jump to line 8500 and then back to the main loop.

The 'flare' routine prints out the eight positions all round your current position and draws a box around them, at the same time taking one off the *fl* variable, and then returns to the main loop at line 1000. But note that the flares will not work on the edges of the array (line 2710 — why do you think that is necessary?)

Finally, the map routine in line 9220 prints out horizontally the 10 rows of that 'page' of the array and marks your current position. Note the double *Pause* statements before jumping to the Status Report, this is to get round the Spectrum Rom bug which sometimes ignores a single *Pause* statement.

Next week we shall look at the final part of *The Pit*. ■

● *The Pit* has been split into three parts. Enter part 2 of the program now and *Save* it on tape. Part 3 will be published next week. You will need to enter all three parts of the program before *Running* it.

```
3025 BEEP .1,0  PRINT ''The mons
ter attacks..."  PAUSE 100  LET
h=ABS (INT (((st*RND)-ar*RND/2)/
2))  PRINT "You take ",h," damag
e."  LET s=s-h  PRINT "Your stre
ngth ";s  PAUSE 30  IF s<=0 THEN
 GO TO 9000
3030 BEEP .1,24  PRINT FLASH 1',
"***Str1ke Nou***"  PAUSE 1  PAU
SE d*5  IF INKEY$="" THEN PRINT
'Too late..."  GO TO 3025
3031 IF INKEY$="s" THEN GO TO 30
50
3032 IF INKEY$="t" THEN GO TO 30
60
3033 IF INKEY$="r" THEN PRINT '"
Cowardly Creature!!"  LET s=s-IN
T ((21-st)/4)  GO TO 8000
3035 PRINT '"You attack..."  PAU
SE 50  LET h=ABS (INT (((s*RND*2
)-de*RND)/2))  PRINT "Monster ta
kes ",h," damage."  LET st=st-h
 PRINT "Its strength ";st  IF st
>0 THEN GO TO 3025
3040 PRINT "You have killed the
monster."  LET p=p+INT (ps/4)  L
ET a$(z,y,x)=" "  IF p$="the War
lord" THEN IF RND*10>6 THEN PRIN
T "You're lucky, the monster was
   carrying treasure..."  GO TO
2010
3045 GO TO 8000
3050 PRINT '' INVERSE 1,"Rest th
y time,thou ferocious andaccurse
d creature"  FOR e=1 TO 60  NEXT
 e  PRINT "The monster staggers.
.."  PAUSE 1: PAUSE 100  IF RND*
P*0>ps*2 THEN PRINT "...and dies
."  GO TO 3040
3055 PRINT "...and recovers."  L
ET p=p-ps/4  GO TO 3025
```

All keyed up!

Peter Chase explains how to use machine code to enhance the Dragon's keyboard

This article is aimed both at readers who have assembler packages and may be wondering what to do next and for those who would like to extend the capabilities of the Dragon by using machine code routines in their Basic programs The following routines are designed to improve keyboard responses and to extend colour and text usage

The *Inkey$* function will only tell that one key is being pressed If more than one key is pressed then neither key will register Similarly, if one key is already being held down a second one will not register

Using machine code it is possible to check if any key is being held down, regardless of how many other keys are being pressed This has very many applications For instance, it allows diagonal movements by pressing two arrow keys or, in action games, one key can be used as an 'accelerator' and another for 'steering', etc

To find out if a key is being pressed, it is necessary to place its column number into location *&HFF02* and then to check the appropriate bits in location *&HFF00* Listing 1 *@KEY* shows how this can be programmed in assembly language

The program works by storing the *A* register in the column select register at *&HFF02* and then comparing the *B* register with the contents of the *row* input register at *&HFF00* Table 1 shows what values to put in the *A* and *B* registers to check any key If the selected key is depressed then the *Z* flag in *CCR* will be set, allowing the use of *BNE* and *BEQ* jumps

For those without assemblers lines 15—60 of Listing 2 show how the routine can be entered into Basic programs by *Poking* the hex codes into locations starting with *&H7001* (the additional codes allow the row and column numbers to be *Poked* into locations *&H7002* and *&H7003)* The routine is then accessed with *Exec &H7001*

Listing 2 itself is a program showing one use of the *@KEY* routine It allows hi-res drawing in eight directions with the four arrow keys Pressing the arrow keys alone gives movement, while depression of shift and arrow keys together allows drawing on the screen You can produce very intricate 3-dimensional drawing with this program which can then be *Saved* as screens on cassette

One of the major drawbacks of the Dragon 32 is that it is not possible to have text and hi-res graphics together using Basic alone Also the number of colours in hi-res modes is very limited However, the video chip used in the Dragon is capable of producing many more modes One of the most useful of these is alpha semigraphics mode 24 which allows usual text 64 x 192 hi-res graphics and nine colours all to be used at once In a previous issue of *Popular Computing Weekly* it was explained how to get into mode 24 from Basic using *Poke &HFFC5 0 Poke &HFFC3 0 Poke &HFFC0 0*

For those with assemblers Listing 3 contains five routines for printing text in mode 24 *@SEL24* selects mode 24 while *@CLS24* fills the mode 24 screen with the character stored in location *&HFF0* *@PT2* prints the character stored in the location *&HFF2* at co-ordinates stored in *&HFF0* and *&HFF1*

@SCRL24 scrolls the screen up one line *@MSG24* prints a message to the screen from the address pointed to by the *Y* register To use the latter routine both *@PT2* and *@SCRL24* must be in memory as well

If you want to use these routines from Basic, then the first four can be entered as shown in lines 15—60 of Listing 2 by *Poking* the hex codes (column two of Listing 3) into addresses starting *&H7FF0* and then *Exec* the address of the routine To use *@MSG24* from Basic it is first necessary to define *Def Usr0 = &H7080* at the start of your program and then use *N = Usr0(Varptr(A$))* where *A$* is the string you wish to print

The real advantage of mode 24 is the mixing of text with 9-colour hi-res graphics The display memory in mode 24 goes from 1024 to 7168 (decimal) Each of the 192 rows contains 32 bytes and each byte is organised as in Figure 1

Fig 1

Set Colours

Colour				
Green	0	0	0	0
Yellow	1	0	0	1
Blue	2	0	1	0
Red	3	0	1	1
Buff	4	1	0	0
Cyan	5	1	0	1
Magenta	6	1	1	0
Orange	[illegible]	1	1	1

For example, to set the top left pixel yellow, then the binary for the appropriate byte is *10011010* which equals 154 in decimal So in Basic, the command would be *Poke 1024 154*. The equivalent assembly instruction is *LDA #154 Sta 1024*

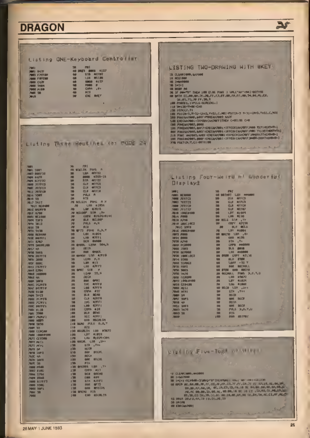
Listing 4 is an assembly program to show the mode 24 9 colour hi-res graphics Listing 5 is a version of this for use without an assembler and shows the mixing of text with hi-res graphics ■

Table 1

	FE	FD	FB	F7	EF	DF	BF
FE	0	8	@	H	P	X	ENT
FD	1	9	A	I	Q	Y	CLR
FB	2	:	8	J	R	Z	BRK
F7	3	;	C	K	S	UP	
EF	4	,	D	L	T	DN	
DF	5	-	E	M	U	RT	
BF	6	.	F	N	V	LT	
7F	7	/	G	O	W	SPC	SFT

Put the number across the top into A or if using BASIC poke it into &H7002. Put the number down the side into B or POKE into &H7003.

continued on page 25



Listing ONE–Keyboard Controller

LISTING TWO–DRAWING WITH @KEY

Listing Three–Routines for MODE 24

Listing Four–Weird n' Wonderful Displays

Listing Five–Test program

Cause and effect . . .

***Calvin Woodings** explains how to use the analysis of variance technique*

In any set of experimental results, the variations which appear will have arisen from a number of different sources. At the very least there will be the variation caused by the effects of the factor being investigated, along with the variation caused by the errors in measuring these effects.

More complex experiments can involve several factors being tried at several levels — unwanted variations can arise from the methtid of measurement, the operator carrying out the tests, the day on which the test was done, and even such apparently unlikely effects as the weather. Analysis of Variance (*Anovar*) is an extremely powerful statistical tool which enables you to quantify such variations, so that you can decide which of the deliberately created effects are important compared with the unwanted error or interaction effects.

Unfortunately, many different types of *Anovar* are required to cope with the many different types of experiment, and a general purpose program to suit all options is way beyond the scope of this article. So, in order to give the reader a taste of the possibilities, this program deals with experiments involving between two and six factors, each at two levels, and with all possible interactions of the factors being studied. Such experiments are known as 2^n *Factorials*, where *n* is the number of factors and *2* is the number of levels of each factor (this notation also tells you how many trials are involved overall, eg, three factors at two levels means 2^3 or 8 separate trials). Such an experiment is frequently used at the outset of an investigation, when you are interested in looking at several different effects to decide which ones merit a more detailed study.

Suppose you are interested in improving the fuel consumption of your car. Suppose also you feel that the grade of fuel, the tyre pressures, and the maximum speed used are going to be important. You decide to measure the consumption over a standard route with two star versus four star fuel, 20 psi versus 30 psi in the tyres, and 50 versus 70 mph as speed limits. The complete factorial experiment will involve 8 runs as shown in Figure 1.

Each run involves a different combination of factors and the table illustrates these runs arranged in the 'standard order' to suit our method of analysis (devised originally by F Yates in 1937). Notice how the levels of the factors alternate going down the columns. The order is *Lo/Hi* for factor 1, *LoLo/HiHi* for factor 2, and *LoLoLoLo/HiHiHiHi* for factor 3.

While it is important to arrange the results in this way prior to analysis, in this sort of trial it is also important not to carry out the runs in the same order. In fact, the run order should be randomised so that any unwanted effects (eg the weather) are not easily confused with the factors being investigated.

Lets assume you carry out the trial and obtain the results shown in the last column of Figure 1. You run the program typing in *3* for the number of factors, *fuel, tyres* and *speed* for the factor names, and *MPG* for the results name — then you type in the results in the order requested. You then have an opportunity to edit the data.

The next prompt, asking for an estimate of the error variance from other similar trials needs some explanation. In *Anovar* the significance of effects and their interactions is estimated by dividing the variance (or mean square) due to the effect under review by the variance due to experimental error. This error variance may be available from the analysis of other trials. Such 'external' estimates of error are to be preferred if available, but if not the full factorial experiment enables you to get an error estimate by treating the more unlikely interactions as errors.

The ratio of effect to error variance is known as the variance ratio or F-ratio. Statistics text books generally contain tables of F-ratio which enable the calculation of the significance of the effects being studied.

In this case, we have no external error estimate so answer *No* to the prompt. The first *Main Effects* table appears (Fig 2) and informs you that increasing *Fuel* (ie, changing from 2 star to 4 star) adds 1.13 miles to your gallon, while increasing *Tyres* (ie tyre pressure) adds 3.63 mpg. Increasing speed reduces mpg by 2.92. The error mean square shows *0* becaues you did not have one from other trials — you are advised to be prepared to note the numbers of those interactions which you are willing to sacrifice in the interests of significance testing.

Continuing to the next screenful, the 1st order interactions (ie, the interactions of all possible pairs of main effects) appear (Fig 2). In this example they are all relatively unimportant as indicated by the small *Mean sq* figure. Similarly the second order interaction (only one possible interaction of groups of three effects in this case) is unlikely to be of any great experimental interest. Note that the numbers of the interactions are the numbers of the 'standard order' used for data entry, and not the order in which they appear on the screen.

Now that you have decided that none of the interactions are of any value, you can pool their variances to estimate the error variance. Enter *3,5,6* and *7* followed by *0* to end and say *Y* to look at the tables again. This time the F-ratios for each effect are given, along with the value of F-ratio corresponding to the 90 percent confidence level (Fig 3). You can now see that

STANDARD ORDER	FUEL GRADE level	FUEL GRADE value	TYRE PRESS level	TYRE PRESS value	SPEED level	SPEED value	RESULTS
1	lo	2	lo	20	lo	50	28.9
2	hi	4	lo	20	lo	50	30.8
3	lo	2	hi	30	lo	50	32.6
4	hi	4	hi	30	lo	50	33.3
5	lo	2	lo	20	hi	70	26.1
6	hi	4	lo	20	hi	70	26.7
7	lo	2	hi	30	hi	70	29.1
8	hi	4	hi	30	hi	70	31.2

Figure 1. Standard order for results in 2^3 Factorial

the tyre pressure effect is not only the biggest factor in improving fuel consumption, but also the effect of highest significance Speed is the next most important effect, and is highly significant in reducing the miles per gallon figure. Fuel is less important

Program notes

Procdataload and *Procentry* control data input the standard order being computed by lines 610 to 650 *Procanalysis* calculates the effects of the changes and the corresponding mean squares using Yates method Note that for 2 level factorials the effect and mean square are exactly equivalent and that the mean square is also the sum of squares (mean squares = sum of squares/dof, and dof or degrees of freedom are 1 in a 2 level experiment) The arrays required for the standard order labels and Yates analysis of a six factor experiment use up nearly all the available memory on the Model B

Procprintout, along with *Procheading*, prints out the results of the analysis for the main effects, and *Procints* handles the interaction pages

Procerror calls for interactions which can be used to estimate error variance Given the standard order numbers of the unwanted interactions, it simply averages their mean squares The degrees of freedom are used in three different ways for calculating error variance (dof), as a flag to check if another interaction has been added to the estimate (dof), and as an approximation with which to enter the F-ratio table (d)

Procext deals with an external estimate of error variance The data at the end of the program consists of the probability points of the F distribution, for cases when the experiment has only 1 degree of freedom per effect, and a 90 percent confidence level is required The F-ratios correspond to increasing degrees of freedom in the error variance estimate (up to 27 dofs) followed by one F-ratio for 28 to 59 dofs (ie 2.85), and another for more than 59 dofs (ie, 2 75) ■

```
MAIN EFFECTS
                          Effect on
No. Change                  M.P.G.     Mean Sq
----------------------------------------------
1  Increasing FUEL          1.13       2.53
2  Increasing TYRES         3.63       26.3
4  Increasing SPEED        -2.92       17.1

Error Mean Square = 0
From 0 Degrees of Freedom

Note No's of interactions you wish to
use as estimate of error variance
from the following tables.

Press any key to continue

1st ORDER INTERACTIONS
                          Effect on
No. Change                  M.P.G.     Mean Sq
----------------------------------------------
3  FUEL TYRES               0.275      0.151
5  FUEL SPEED               0.225      0.101
6  TYRES SPEED              0.125      3.12E-2
Press any key to continue

2nd ORDER INTERACTIONS
                          Effect on
No. Change                  M.P.G.     Mean Sq
----------------------------------------------
7  FUEL TYRES SPEED         0.475      0.451

Enter No's of interactions you want to
use as estimate of the error variance.
          ('0' to finish)
```

Figure 2. Print out on first Pass

```
MAIN EFFECTS
                        Effect on
No. Change                M.P.G.     F-ratio
--------------------------------------------
1  Increasing FUEL        1.13       13.8
2  Increasing TYRES       3.63       143
4  Increasing SPEED      -2.92       93.1

Error Mean Square = 0.184
From 4 Degrees of Freedom

If F-ratio>4.54 then effect of change
is significant at >90% level.

If F-ratio=0 then effect has been chosen
to estimate error.
```

Figure 3. Print out on second Pass

Continued over the page

```
10   REM STATISTICS/ANALYSIS OF VARIANCE
20   REM FOR 2^N FACTORIAL EXPTS.
30   REM (C) C.R.WOODINGS/MAY 1983
40   REM FOR BBC MICRO MODEL B
50
60 MODE7:PROCtitle
70 CLS:PRINTTAB(8,12)"Enter number of
   factors (min=2:max=6) ";
80 f=VALFNinput(1,49,55):r=2^f
90 DIM F$(f),data(f,r),name$(f),efec(r),
   mnsqr(r),lbl$(r),int$(r)
100 fctr=f:rslt=r:ext=0
110 PROCdataload
120 REPEAT:dof=0:erv=0
130 CLS:IF FNyes_no(10,12,"Edit the data")
    PROCreview
140 CLS:PRINTTAB(15,12)"COMPUTING":
    PROCanalysis
150 CLS:IF FNyes_no(1,11,"Do you have a good
    estimate of error variance from other
    trials") THEN PROCext:GOTO180
160 p=0:REPEAT:PROCprintout(p):PROCerror
    (p):p=p+1
170 UNTIL NOT FNyes_no(5,VPOS+1,
    "See the tables again")
180 UNTIL NOT FNyes_no(10,VPOS+1,
    "Another run")
190 MODE7:PROCdouble_height(11,"BYE",132)
    :END
200
210 DEFPROCtitle
220   PROCdouble_height(8,"STATISTICS",132)
230   PROCdouble_height(12,"Analysis of 2^n
      Factorial Experiment",131)
240   PROCcontinue:ENDPROC
250
260 DEFPROCdouble_height(row,words$,colour)
270   column=INT((40-LEN(words$))/2)-2
280   FOR I=row TO row+1:PRINTTAB(column,I);
      CHR$141;CHR$colour;words$
290   NEXT:ENDPROC
300
310 DEFFNyes_no(x,y,A$)
320   LOCAL ans:PRINTTAB(x,y);A$;" (Y/N) ? ";
330   REPEAT:ans=(GET AND &DF) UNTIL ans=&59
      OR ans=&4E:PRINTCHR$ans
340   =(CHR$ans="Y")
350
360 DEFPROCcontinue
370   PRINTTAB(7,23)"Press any key to
      continue ";:REPEATUNTILGET:ENDPROC
380
390 DEFFNinput(len,loASC,hiASC)
400   LOCAL K%,Z%:K%=0:In$="":PRINT STRING$
      (len,".");STRING$(len+1,CHR$8);" ";
      :*FX15,1
410   REPEAT:Z%=GET
420   IF Z%=127 AND K%>0 THEN K%=K%-1:In$=
      LEFT$(In$,K%):VDUZ%,46,8:GOTO450
430   IF Z%>loASC AND K%<len AND Z%<hiASC
      THEN K%=K%+1:In$=In$+CHR$Z%:VDUZ%:GO
      TO450
440   IF NOT(Z%=13 AND K%>0) VDU7
450   UNTIL Z%=13 AND K%>0
460   =In$
470
480 DEFPROCreview
490   FOR N%=0 TO rslt-1
500   PROCentry("EDITING")
510   PRINT;data(0,N%):IF FNyes_no(0,15,
      "Change entry") THEN PRINTTAB(0,17)"NE
      W RESULT = ";:data(0,N%)=EVALFNinput
      (10,40,58)
520   NEXT:ENDPROC
530
540 DEFPROCdataload
550   FOR N=1 TO fctr:CLS
560   PRINTTAB(3,12)"Enter a name for factor
      ";N;" ";
570   name$(N)=FNinput(5,32,127):NEXT
580   CLS:PRINTTAB(5,12)"Enter a name for
      results.";
590   rslt$=FNinput(6,32,127):CLS:PRINTTAB
      (15,12)"COMPUTING"
600   REM rest of Procedure sets results in
      standard order for Yates Method
610   X=1:R=0:REPEAT
620   FOR N%=1 TO rslt/X
630   FOR M%=1 TO X
640   IF N%DIV2<>N%/2 THEN F$(R)=F$(R)+"
      Lo" ELSE F$(R)=F$(R)+" Hi"
650   NEXT:NEXT:X=2*X:R=R+1:UNTIL R=fctr
660   FOR N%=0 TO rslt-1
670   PROCentry("LOADING")
680   data(0,N%)=EVALFNinput(10,40,58)
690   NEXT:ENDPROC
700
710 DEFPROCentry(S$)
720   CLS:PRINTTAB(12,1)"DATA ";S$:PRINTTAB
      (0,11-fctr);
730   FOR X%=0 TO fctr-1:level$=MID$(F$(X%),
      N%*3+1,3)
740   PRINTTAB(10);name$(X%+1);TAB(17)"at";
      level$;" level"
750   IF S$="EDITING" THEN 780
760   IF level$=" Hi" THEN level$="H" ELSE
      level$="L"
770   lbl$(N%)=lbl$(N%)+level$
780   NEXT:PRINT'TAB(10)"Result = ";:ENDPROC
790
800 DEFPROCanalysis total=0
810   FOR M%=0 TO fctr-1
820   FOR N%=0 TO rslt-1 STEP 2
830   data(M%+1,N%/2)=data(M%,N%)+data
      (M%,N%+1)
840   data(M%+1,N%/2+rslt/2)=data(M%,N%+1)
      -data(M%,N%)
850   NEXT:NEXT
860   FOR N%=0 TO rslt-1
870   efec(N%)=data(M%,N%)/2^(M%-1)
880   mnsqr(N%)=data(M%,N%)^2/rslt
890   NEXT:mnsqr(0)=0:ENDPROC
900
910 DEFPROCprintout(Pass) @%=&308
920   CLS:PRINT:PROCheading("MAIN EFFECTS")
930   N=1:FOR M=1 TO fctr
940   PRINT;N;TAB(3);"Increasing ";name$(M);
      TAB(23);efec(N);TAB(32);
950   IF Pass=0 THEN PRINT;mnsqr(N) ELSE
      PRINT;mnsqr(N)/erv
960   N=N*2:NEXT:PRINT'"Error Mean Square =
      ";erv'"From ";dof;" Degrees of Freedom"'
970   IF Pass THEN PRINT"If F-ratio>";f_ratio
      ;" then effect of change   is sig
      nificant at >90% level."''"If F-ratio=0
      then effect has been chosento estimate
      error."
980   IF ext OR Pass THEN 1000
990   PRINT"Note No's of interactions you
      wish to"'"use as estimate of error v
      ariance"'"from the following tables."'
1000  FOR N=2 TO fctr:PROCcontinue
1010  PROCints(N-1,Pass)
1020  NEXT:@%=10:ENDPROC
1030
1040 DEFPROCints(order,Pass) VDU26:CLS
1050  IF order=1 THEN S$="st" ELSE IF order=2
      THEN S$="nd" ELSE IF order=3 THE
      N S$="rd" ELSE S$="th"
```

```
1060   PRINT';order;S$;PROCheading("ORDER
       INTERACTIONS")
1070   FOR N%=3 TO ralt:int$(N%)="":flag=-1
1080   FOR X%=1 TO fctr
1090   IF MID$(lbl$(N%),X%,1)="H" THEN int$
       (N%)=int$(N%)+" "+name$(X%):flag=fla
       g+1
1100   NEXT
1110   IF flag=order THEN PRINT;N%;TAB(2);
       int$(N%)TAB(23);efec(N%);TAB(32);:GOT
       O1120:ELSE GOTO1130
1120   IF pass=0 THEN PRINT;mnsqr(N%) ELSE
       PRINT;mnsqr(N%)/erv
1130   IF VPOS>21 THEN PROCcontinue:VDU28,0,
       24,39,5:CLS
1140   NEXT:ENDPROC
1150
1160 DEFPROCheading(C$)
1170   PRINTC$:'TAB(21)"Effect on"
1180   PRINT"No.";TAB(4)"Change";TAB(23);
       ralt$;TAB(32);
1190   IF pass=0 THEN  PRINT"Mean Sq" ELSE
       PRINT"F-ratio"
1200   PRINTSTRING$(39,"_"):ENDPROC
1210
1220 DEFPROCerror(pass) Dof=0
1230   IF ext THEN 1310
1240   IF pass THEN PRINTTAB(2,9)'Add
       interactions to error estimate? "ELSE
       PRINTTAB(0,9)"Enter No s of interac
       tions you want to" "use as estimate of
       the error variance."
1250   PRINTTAB(12)"('0  to finish)"'
1260   REPEAT:err=VALFNinput(2,40,50) VDU9,9
1270   IF err=0 OR mnsqr(err)=0 THEN 1300
1280   erv=erv+mnsqr(err)
1290   mnsqr(err)=0 dof=dof+1:Dof=dof
1300   UNTIL err=0
1310   d=dof:IF Dof=dof erv=erv/dof
1320   IF dof>27 AND dof<60 THEN d=28
1330   IF dof>=60 THEN d=29
1340   FOR N%=1 TO d:READ f_ratio:NEXT
1350   RESTORE ENDPROC
1360
1370 DEFPROCext
1380   ext=-1:CLS:PRINTTAB(1,12)"Enter the
       error variance estimate ";
1390   erv=VALFNinput(5,40,50)
1400   CLS PRINTTAB(1,12)"Enter the degrees
       of freedom on which   this error va
      riance is based.";
1410   dof=VALFNinput(5,40,50)
1420   PROCerror(1) PROCprintout(1):ENDPROC
1430
1440 DATA 39.9,8.53,5.54,4.54,4.06,3.78,3.59,
     3.46 3.36,3.28,3.23,3,18,3.14
1450 DATA 3.1,3.07,3.05,3.03,3.01,2.99,2,97,
     2,96,2.95 2.94,2.93,2.92,2.91
1460 DATA 2,90,2.85,2.75 REM 90% probability
     points of f_ratio for 1 to 27,>27,
     and >59 degrees of freedom
```



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Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the _Program of the Week_ double our new fee of £6 for each program published

Jackpot

on ZX81

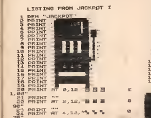
The screen displays a fruit machine and all the winning combinations possible. These can very easily be changed by changing lines 20 to line 35.

Line 47 to line 79 choose three different reels at random to be displayed for the winnings. These can also very easily be changed by altering line 47. Add as many characters to the variable B$ as you like then alter line 50 (let J = _Int_ (_Rnd_x?) + 1). The question mark should always be one more than the amount of characters in B$.

When all this is done and it is exactly as you desire it to be, save it on tape by typing _Goto_ 120. You are now ready to run it. Hit key "R" to spin the reels.

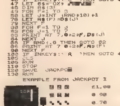
Graphics note

Line 47 = OX• (SHIFT T) (SHIFT H) (INV SPACE) (SHIFT Y) (INV £) (INV ?)



```
LISTING FROM JACKPOT I

 1 REM "JACKPOT"
 2 PRINT
 3 PRINT
 4 PRINT
 5 PRINT
 6 PRINT
 7 PRINT
 8 PRINT
 9 PRINT
10 PRINT
11 PRINT
12 PRINT
13 PRINT
14 PRINT
15 PRINT
16 PRINT
17 PRINT
18 PRINT
19 PRINT
20 PRINT AT 0,12                £
1,00"
21 PRINT ""
22 PRINT AT 2,12,               0
90"
23 PRINT ""
24 PRINT AT 4,12,"              0
70"
25 PRINT ""
26 PRINT AT 6,12,"              0
60"
27 PRINT AT 8,12,"              0
50"
28 PRINT AT 10,12,"* O O
0 50"
29 PRINT AT 12,12,"-
0 50"
32 PRINT AT 14,12 "* * *
0 30"
33 PRINT AT 16,12,"     -
0 20"
34 PRINT AT 18,12,   - -
0 10"
35 PRINT AT 20,12, * - -
0.10"
```



```
 46 IF INKEY$<>"R" THEN GOTO 46
 47 LET B$= OX•
 48 DIM A$(3)
 49 FOR F=1 TO 3
 50 LET J=INT (RND*10) +1
 78 LET A$(F)=B$(J)
 79 NEXT F
 80 FOR F=1 TO 3
 82 FOR J=1 TO 7
 83 PRINT AT 7,0+2*F,B$(J)
 84 NEXT J
 85 IF RND<.6 THEN GOTO 82
 86 PRINT AT 7,0+2*F,A$(F)
 90 NEXT F
100 IF INKEY$<>"R" THEN GOTO 46
105 CLS
106 RUN
110 STOP
120 SAVE "JACKPOT"
130 RUN
EXAMPLE FROM JACKPOT I
                £1.00
                0 90
                0.70
                0 60
                0 50
   * O O        0 50
   -            0 50
   * * *        0 30
       -        0.20
     - -        0 10
```

Jackpot
by Peter Morton

Prism

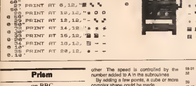
on BBC

This program will produce a prism which will rotate first in one direction then the other. The speed is controlled by the number added to A in the subroutines.

By adding a few points, a cube or more complex shape could be made.

Program notes

5 Cursor off
18-31 Draws the prism
32 This colour is easier on the eyes than normal white
39 Draws the foreground square
40-49 Decides which subroutine to use
51 Calls appropriate subroutine
1000 2000 Subroutines. Try altering the numbers.



```
   5 VDU23;8202;0;0;0;
  10 A=100:GOS=1000
  11 XXX=100
  15 MODE4
  17 C=A+600
  18 MOVE A+XXX,500:DRAW C+XXX,500
  20 MOVE A+XXX,500:DRAWA,900
  21 MOVE C+XXX,500:DRAWC,900
  30 MOVE C+XXX,500:DRAWC,300
  31 MOVE A+XXX,500:DRAW A,300
  32 GCOL0,1
  39 DRAWA,900:DRAWC,900:DRAWC,300:
     DRAWA,300:GCOL0,2
  40 IF A+800>1280 THEN GOS=2000
  48 IF A<0 THEN GOS=1000
  49 IF XXX=1200 THEN GOS=1000
  51 GOSUB GOS
  55 GOTO15
1000 A=A+10:XXX=XXX-10:RETURN
2000 A=A-10:XXX=XXX+10:RETURN
```

Prism
by M Weatherill

Lunar Lander

on Spectrum

In the game you are a ground-based flight controller responsible for the guidance and safe landing of several modules returning to the moon's surface at bases A and B.

More points are awarded for landing at B, as it is more difficult than landing at A. The real problem is bringing the landing speed of the modules down to required limits before fuel is used up.

Once a module has crashed the game is over.

Program notes

User defined graphics: 1 2 2026.

Draws scenery: 10 100 2001 2022 2013 & 9825
Sets up variables: 110 305 2027
Movement of module: 140 155 300 & 310 2020 2023 2030 9821 9835
Draws border: 2013
Checks module sinking scenery: 305 & 2029
Prints red border — fuel low: 311 & 2031
Module landing: 2040
Instructions: 9999
Module crash routine: 9998-9999

```
  1 LET D1=0  GO SUB 8999  PAUS
E 0  CLS  GO SUB 9007  FOR X=0
TO 7  READ A  POKE USR "A"+X,A
NEXT X  DATA 126,185,255,126,24,
36,66,231  LET a=1  LET b=1  POK
E 23658,8  LET SCORE=0  FOR X=0
TO 7  READ A  POKE USR "B"+X,A
NEXT X  DATA 3,31,56,63,63,63,31
,7  FOR X=0 TO 7  READ A  POKE U
SR "C"+X,A  NEXT X  DATA 199,248
,60,252,252,252,248,224
  2 FOR X=0 TO 7  READ A  POKE
USR "E"+X,A  NEXT X  DATA 199,22
8,112,56,28,56,0,0  FOR X=0 TO 7
  READ A  POKE USR "D"+X,A  NEXT
 X  DATA 3,7,14,28,56,124,0,0
 10 CLS  PLOT 0,56  DRAW 24,8
 DRAW 8,-8  DRAW 16,0  DRAW 0,-2
 DRAW 16,0  DRAW 56,84  DRAW 24
,4  DRAW -24,-64  DRAW 16,-56  D
RAW 8,8  DRAW 12,88  DRAW 20,4
DRAW 8,89  DRAW 40,8  DRAW 16,-8
 100 PRINT AT 15,6,"▀",AT 14,80,
"▀"
 110 LET FUEL=35  LET SPEED=0  L
ET a=1  LET b=2
 140 IF INKEY$="" THEN LET b=b+1
  LET SPEED=SPEED+1  PRINT AT a-
1,b-1," ",AT a,b," "  PRINT AT a
,b+1,"  "  LET a=a+1
 141 IF FUEL<9 THEN BORDER 2
 143 IF INKEY$="6" THEN PRINT AT
 a,b+1,"▀"  LET FUEL=FUEL-2
 145 IF INKEY$="8" AND b<30 THEN
 LET FUEL=FUEL-.5  LET SPEED=SPE
ED+.8  PRINT AT a,b+1,"   "  LET b
=b+1  BEEP .1,20
 150 IF INKEY$="5" AND b>0 THEN
LET FUEL=FUEL-.8  PRINT AT a,b+1
," "  LET SPEED=SPEED+.5  LET b=
b-1  BEEP .1,20
 151 PRINT AT 3,17, BRIGHT 1, IN
K 6,"▀"  BRIGHT 0
 155 IF INKEY$="7" AND a>0 THEN
PRINT AT a,b+1," "  LET SPEED=SP
EED-3  LET FUEL=FUEL-1  LET a=a-
1  BEEP .1,20
 300 IF a=14 AND b=5 OR a=14 AND
 b=4 THEN CLS  GO TO 9800
 301 PLOT 240,0  DRAW 0,175  PLO
T 0,175  DRAW 0,-175
 302 IF FUEL<0 THEN LET FUEL=0
 303 IF SPEED<1 THEN LET SPEED=S
PEED+4
 304 PRINT AT 3,17, BRIGHT 1, IN
K 2,"▀"  BRIGHT 0
 305 IF SCREEN$ (a,b)<>" " THEN
FOR f=0 TO 7  POKE USR "q"+f,RND
*255  NEXT f  PRINT AT a,b+1, IN
K 6,"▀"  FOR f=1 TO 180  NEXT f
 CLS  GO TO 9000
 306 PRINT AT 0,0,"VELOCITY ",SP
EED,"  ",AT 21,10,"SCORE ",SCORE
,AT 0,16,"FUEL ",FUEL  FOR f=0 T
O 15  PRINT AT a,b+1,"▀"  NEXT f
 310 IF a=18 AND b=20 OR a=18 AN
D b=19 THEN GO TO 2000
 311 IF FUEL<1 THEN LET a=a+1  P
RINT AT a-1,b+1," ",AT a,b+1,"▀"
  GO TO 300
 200 GO TO 111
2001 CLS  IF D1=0 THEN PLOT 159
,0  DRAW 56,16  DRAW 0,15  DRAW
-8,8  DRAW 16,48  DRAW -8,32  DR
AW 8,48  DRAW 38,0  PLOT 45,0  D
RAW 8,24  DRAW 8,8  DRAW 0,16  D
RAW 16,84  DRAW -24,48  DRAW -56
,8  LET 0=3  LET U=15  PRINT AT
0,U,"^",AT 0-1,U,"●"
2013 PLOT 0,0  DRAW 255,0  DRAW
0,168  DRAW -255,0  DRAW 0,-168
2020 IF INKEY$="6" THEN PRINT AT
 0,U-1," ",AT 0-1,U-1," ",AT 0-1
,U+2," ",AT 0,U+2," "  LET U=U+1
2021 IF INKEY$="5" THEN PRINT AT
 0,U+2,"  ",AT 0-1,U+2," ",AT 0,U
-1," ",AT 0-1,U-1," "  LET U=U-1
2022 IF INKEY$="7" AND 0-1>1 THE
N LET 0=0-1  PRINT AT 0+1,U,"  "
  LET SPEED=SPEED-3  LET FUEL=FU
EL-1
2023 IF INKEY$="" THEN LET 0=0+1
  PRINT AT 0-2,U,"  "  LET SPEED
=SPEED+1
2024 PRINT AT 0,U,"^",AT 0-1,U,
"●"
2025 IF 0=19 AND D1=0 THEN CLS
 LET D1=1  LET 0=3  IF D1=1 THEN
 PLOT 120,32  DRAW INK 3,16,0  P
LOT 120,16  DRAW 16,0  DRAW 0,8
 DRAW 48,0  DRAW -16,32  DRAW 8,
32  DRAW -16,24  DRAW -8,16  DRA
W 8,40  PLOT 120,16  DRAW 8,8  D
RAW -24,8  DRAW -32,40  DRAW 64,
40  DRAW -24,32  DRAW -16,32
2026 PRINT AT 0,U,"^",AT 0-1,U,
"●"
2027 IF SPEED<1 THEN LET SPEED=0
2028 IF FUEL<1 THEN LET FUEL=0
2029 IF SCREEN$ (0+1,U)<>" " AND
 ATTR (0+1,U)<>3 THEN GO TO 9998
  IF SCREEN$ (0+1,U+1)<>" " AND
ATTR (0+1,U+1)<>3 THEN GO TO 999
8  IF SCREEN$ (0,U-1)<>" " AND A
TTR (0,U)<>3 THEN GO TO 9998  IF
 SCREEN$ (0,U+2)<>" " AND ATTR (
0,U)<>3 THEN GO TO 9998
2030 IF INKEY$="8" THEN PRINT AT
 0,U,"^",AT 0-1,U,"●"  LET FUE
L=FUEL-2
2031 PRINT AT 1,0,"VELOCITY(",SP
EED,") FUEL(",FUEL,") SCORE(",S
CORE,")      "  IF FUEL<2 THEN PRI
NT AT 0-2,U,"  ",AT 0-1,U,"  "
LET 0=0+1  GO TO 2024
2032 PRINT AT 1,0,"VELOCITY(",SP
EED,") FUEL(",FUEL,") SCORE(",SC
ORE,")      "  IF SPEED<0 THEN LET
SPEED=0
2033 PRINT AT 0,U-2," "  PRINT A
T 0,U-1," ",AT 0-1,U-1," ",AT 0,
U+2," ",AT 0-1,U+2," "
2040 IF 0=15 AND U=15 AND D1=1 A
ND SPEED<6 AND SPEED>0 THEN PRIN
T AT 0-1,U,"  ",AT 0,U,"  "  PRI
NT AT 0+1,U,"●",AT 0+2,U,"^"
PLOT 120,31  DRAW INK 2,16,0  LE
T SCORE=SCORE+4  FOR F=0 TO 100
 NEXT F  GO TO 9911
2041 IF FUEL<10 THEN BORDER 2
8997 GO TO 2010
8998 STOP
8999 CLS  BORDER 0  PAPER 0  IN
K 7  CLS  PRINT AT 21,0,"Press
any key"  PRINT AT 0,11,"MESSAGE
 TO",AT 2,8, FLASH 1,"[redacted]", FLASH 0,AT 4,4,"BY DAVI
D DYER (AGE 11)",AT 10,0,"THE KE
YS ARE AS FOLLOWS ",AT 12,10,"8-
RIGHT",AT 14,10,"5-LEFT",AT 15,1
0,"6-HOLD",AT 16,10,"7-THRUST"
RETURN
9000 CLS  PRINT AT 8,2,"END OF
MISSION",AT 10,2,"MODULE DESTROY
ED",AT 12,2,"COLLISION VELOCITY
WAS ",SPEED,"
              KNOTS",AT 18,2,"YOUR
SCORE IS ",SCORE
9001 STOP
9002 CLS  PLOT 16,149  DRAW 170
,0  PRINT AT 2,2,"TOUCH DOWN VEL
OCITIES.",AT 5,2,"BASE 'A' 0-9 K
NOTS,   SCORE+2"  PRINT AT 7,2,"
BASE 'B' 0-5 KNOTS,   SCORE+4",A
T 21,0,"Press any key to contact
 module"  PAUSE 0  CLS  RETURN
9813 LET g=3  LET h=12  PRINT AT
 g-1,h+1,"●",AT g,h+1,"^"
9814 PRINT AT 1,1,"VELOCITY(",SP
EED,")",AT 2,1,"FUEL(",FUEL,")",
AT 3,1,"SCORE(",SCORE,")"
9815 PLOT 0,32  DRAW 72,16  DRAW
 24,48  DRAW 0,-32  DRAW 40,0  D
RAW 0,40  DRAW 24,-24  DRAW 40,0
  DRAW -8,-64
9820 PRINT AT g-1,h+2," ",AT g,h
+2," "  PLOT 0,0  DRAW 255,0  DR
AW 0,175  DRAW -255,0  DRAW 0,-1
75
```

```
9821 IF INKEY$="" THEN LET g=g+1
 LET SPEED=SPEED+1  PRINT AT g-
2,h,"  "
9822 IF INKEY$="7" AND g-1>3 AND
 SPEED>0 THEN LET SPEED=SPEED-2
 LET FUEL=FUEL-1  LET g=g-1  PRI
NT AT g+1,h,"  "
9823 IF INKEY$="6" AND h>5 THEN
LET h=h-1  PRINT AT g,h+0," ",AT
 g-1,h+2," "
9824 IF INKEY$="8" AND h<28 THEN
 LET h=h+1  PRINT AT g,h-1," ",A
T g-1,h-1," "
9825 PLOT 0,32  DRAW 70,16  DRAW
 24,40  DRAW 0,-32  DRAW 40,0  D
RAW 0,40  DRAW 24,-24  DRAW 48,0
  DRAW -8,-84
9827 IF SPEED<0 THEN LET SPEED=S
PEED+4
9829 IF INKEY$="0" THEN PRINT AT
 g-1,h," ",AT g,h,"^"  LET FUE
L=FUEL-2
9830 IF FUEL<0 THEN LET FUEL=0
IF FUEL<1 THEN LET g=g+1  PRINT
AT g-2,h,"  "  PRINT AT g,h,"^"
,AT g-1,h," "  IF SCREEN$ (g+1,
h)<>" " THEN GO TO 9999  IF SCRE
EN$ (g+1,h+1)<>" " THEN GO TO 99
99  GO TO 9826
9832 IF SCREEN$ (g,h-1)<>" " AND
 ATTR (g,h)<>3 THEN GO TO 9999
9833 IF SCREEN$ (g,h+2)<>" " AND
 ATTR (g,h)<>3 THEN GO TO 9999
9834 PRINT AT g,h-1,"  ",AT g-1,h
-1,"  "  PRINT AT g-1,h," ",AT g
,h,"^"
9838 PLOT INK 3,104,64  DRAW INK
 3,16,0  IF g=13 AND h=13 AND SP
EED>0 AND SPEED<3 THEN PAUSE 0
LET SCORE=SCORE+2  FOR F=0 TO 20
0  NEXT F  CLS  GO TO 9900
9836 PRINT AT 1,1,"VELOCITY(",SP
EED,") ",AT 2,1,"FUEL(",FUEL,")"
,AT 3,1,"SCORE(",SCORE,")"
9837 IF FUEL<10 THEN BORDER 2
9880 GO TO 9820
9911 BORDER 0  CLS  PAUSE 80  P
RINT AT 10,9,"ALPHA-CORRECT SURF
ACE CONTACT",AT 11,9,"STANDBY C
ONTROLLER FOR NEXT  MODULE AR
RIVING ON SCHEDULE'''Press any
 key to contact next  module".
PAUSE 0  GO TO 10
9998 BORDER 0  FOR F=0 TO 9  FOR
 X=1 TO 8  POKE USR "O"+X,RND*25
5  NEXT X  PRINT AT Q,W-1, INK 6
; FLASH 1,"  ",AT Q-1,W-1, INK
6; FLASH 1,"  "  FLASH 0  NEXT
F  PRINT AT Q,W,"  ",AT Q-1,W,"
 "  CLS  FOR F=0 TO 21  PAUSE
 5  PRINT AT F,0,"END OF MISSION
",AT F-1,0,"               "  NEX
T F  PRINT AT 10,0,"Press any ke
y for another game". PAUSE 0  RU
N
9999 BORDER 0  FOR F=0 TO 10  FO
R X=0 TO 7  POKE USR "O"+X,RND*2
55  NEXT X  PRINT AT g,h, INK 6,
 FLASH 1,"  ",AT g-1,h, INK 6,
FLASH 1,"  "  NEXT F  PRINT AT
g,h,"  ",AT g-1,h,"  "  CLS
FOR F=0 TO 21  PAUSE 0  PRINT AT
 F,0,"END OF MISSION",AT F-1,0,"
              "  NEXT F  PRINT A
T 10,0,"Press any key for anothe
r game"  PAUSE 0  RUN
```

Lunar Lander
by G Dyer

Colour Mix

on BBC Micro

I have enclosed a utility program for either model of the BBC computer which will allow the user to intermix any two colours from a range of eight available colours.

This will produce fairly reasonable colours you would expect if you mixed the colours as if they were paint.

But as many readers will know they can't be mixed as well as they are not pure colours. The produced colours will not be true, but I hope this short program will help readers to make their choice for colour mixes good ones.

```
10
20 REM"         Colour Mix
30 A$="   Author:   Mark Colson
40           "
50 MODE7
60 VDU23;8202;0;0;0;
70 VDU23,224,170,85,170,85,170,
   85,170,85
80 PROCintro
90 MODE4
100 VDU23;8202;0;0;0;
110 VDU19,0,A-1;0;
120 VDU19,1,B-1;0;
130 FORA%=1TO1240
140 VDU224
150 NEXT
160 A$=GET$
170 RUN
180
190 DEF PROCintro
200 PRINTCHR$157
210 FORF=1TO2:PRINTCHR$157CHR$141
    CHR$129CHR$136TAB(14)"COLOUR
    MIX":NEXTF
220 PRINTCHR$157
230 PRINT" "CHR$131CHR$157CHR$130
    TAB(6)A$"    "CHR$156
240 PRINTCHR$157CHR$132"PICK TWO
    OF THESE COLOURS (BY NUMBER)"
250 PRINTCHR$157
260 DATABLACK,RED,GREEN,YELLOW,
    BLUE,MAGENTA,CYAN,WHITE
270 FORF=1TO8
280 READA$
290 PRINTCHR$157CHR$133TAB(5)F;".
    "A$
300 NEXTF
310 PRINTCHR$157
320 PRINTCHR$133CHR$157CHR$135TAB
    (4)"Press any key after to
    continue    "CHR$156
330 A=VAL(GET$)
340 B=VAL(GET$)
350 ENDPROC
>RUN
```

Colour Mix
by Mark Colson

Parachute Attack

on Lynx

This is a game for the Lynx involving falling parachutes

You are on a hillside and parachutes are falling from the sky and into a boat

You must shoot them before they get there. You are given six skill levels which determine how and how fast the parachutes falls

Shoot with the space bar — you have 20 shots. The computer will bleep when you have hit a parachute

Variables

T=Total points
E=Skill level and speed of parachute
A+B=Co-ordinates
O$=Points or Point
R = Parachutes that got away

```
100 REM *** PARACHUTE ATTACK ***
110 REM *** JOANNA GREENWOOD ***
120 LET R=0
130 LET T=0
140 LET M=0
150 LET X=190
160 LET U=190
170 LET P=0
180 LET N=0
190 CLS
200 INPUT "SKILL LEVEL (1 TO 6)";E
210 IF E>6 THEN GOTO 200
230 LET E=E+1
250 RANDOM
260 PAPER 1
250 CLS
260 INK 4
270 FOR D=136 TO 230
290 LET U=U-1
290 PLOT 0,U,D
300 PLOT 2,255,D
310 NEXT D
320 INK 0
330 FOR D=120 TO 136
340 PLOT 0,212,D
350 PLOT 2,215,D
360 NEXT D
370 INK 0
380 FOR L=115 TO 119
390 PLOT 0,190,L
400 PLOT 2,220,L
410 NEXT L
420 INK 5
430 FOR J=231 TO 247
440 PLOT 0,0,J
450 PLOT 2,255,J
460 NEXT J
470 INK 0
480 FOR Y=215 TO 229
490 LET X=X-1
500 LET M=M+1
510 PLOT 0,M,Y
520 PLOT 2,X,Y
530 NEXT Y
540 LET B=5
550 LET A=RAND(90)+10
560 INK 7
570 PLOT 4,A,B
580 PLOT 0,A-2,B+1
590 PLOT 2,A+2,B+1
600 PLOT 0,A-4,B+2
610 PLOT 2,A+4,B+2
620 PLOT 0,A-5,B+3
630 PLOT 2,A+5,B+3
640 PLOT 0,A-5,B+4
650 PLOT 2,A+5,B+4
660 PLOT 0,A-4,B+5
670 PLOT 2,A,B+13
680 PLOT 0,A+4,B+5
690 PLOT 2,A,B+13
700 PLOT 0,A,B+5
710 PLOT 2,A,B+13
720 IF N=9 THEN GOTO 1020
730 IF INK=1 THEN GOTO 770
740 INK 1
750 IF KEY$=" " THEN GOTO 820
760 GOTO 570
770 LET B=B+E
780 IF B>203 THEN LET R=R+1
790 IF B>203 THEN GOTO 540
800 IF KEY$=" " THEN GOTO 820
810 GOTO 540
820 INK 6
830 PLOT 0,189,117
840 PLOT 2,A,117
850 IF INK=1 THEN GOTO 900
860 LET P=P+1
870 IF P 20 THEN GOTO 1040
880 IF INK 1
890 GOTO 570
900 IF B+4=117 THEN GOTO 950
910 IF B+5=117 THEN GOTO 950
920 IF B+6=117 THEN GOTO 950
930 IF B+7=117 THEN GOTO 950
940 GOTO 570
950 LET T=T+1
960 BEEP 50,100,63
970 INK 7
980 PAUSE 2500
990 LET N=9
1000 INK 1
1010 GOTO 570
1020 LET N=0
1030 GOTO 540
1040 CLS
1050 VDU 24
1060 IF T<>1 THEN LET O$="S"
1070 ELSE LET O$=" "
1080 PRINT "YOU SCORED ";T;" POINT";O$
1090 PRINT "USING 20 SHOTS"
1100 IF R<>1 THEN LET O$="S"
1110 ELSE LET O$=" "
1120 PRINT R;" PARACHUTE";O$;" GOT AWAY"
1130 VDU 25
1140 PRINT @ 3,80;"WOULD YOU LIKE ANOTHER GO (Y/N)"
1150 IF GET$="Y" THEN GOTO 180
1160 END
```

Parachute Attack
by Joanna Greenwood

Eerly Bird

on Spectrum

You are a poor little bird who is stranded in Mr Green s garden with a broken wing. But be careful, a cat is on the prowl and out to devour you

In the garden there is a puddle that slowly soaks away. You must avoid hopping into it or you will drown

In order to recover you must catch 10 worms

Full instructions are contained in the program

Program notes

10-89 User defined graphics
99-199 Initialise
200-299 Set up screen
300-320 Move bird and check position
325-380 Move cat and check position
380-390 Move worm and check position
900 967 Concluding comments
990 999 Instructions

PROGRAM OF THE WEEK

```
1 GO SUB 900
10 FOR I=0 TO [illegible]
15 DATA 56,40,56,16,146,84,56,
16
20 DATA 165 30 159,90 [illegible] 24
24
30 DATA 24,24,36,219,219,36,24
,24
[illegible] 0,3 4,160,160 144 0,0
55 DATA 159,136,130 2[illegible]4;28
8,56 60
60 DATA 0,135,60 56 56 16 16,2
4
70 DATA 0,0,0,0,0,0,0,0
80 DATA 96,226 34 [illegible] 24
90 LET sc=0 LET L=.5 GO SUB
200
100 GO SUB 296 LET a=6 LET b=
8 LET X=10 LET y=30
150 LET y= INT (RND*a1/ LET w=
INT [illegible]
[illegible] THEN GO TO 120
130 LET b$= H
170 PRINT AT [illegible] INK
[illegible]
190 GO TO 300
200 PAPER 4 INK 4 INVERSE 0
OVER 0 BRIGHT 0 FLASH 0 BORDE
[illegible]
210 FOR I=0 TO 31 PRINT INK 0;
AT 0 [illegible] AT 21,I [illegible]
[illegible]
220 PRINT [illegible] INK 1
[illegible] PRINT AT [illegible]
INK [illegible] NEXT I
230 [illegible] PRINT [illegible]
[illegible]
[illegible] INK
[illegible] 4,4 [illegible]
250 PRINT PAPER 7;AT 3 2 [illegible] AT
```

Continued on page 39


```
3,0,    ,AT 0,2,    AT 5,0,
280 FOR f=18 TO 20  PRINT AT f,
0, PAPER 0, BRIGHT 1,
              NEXT f
290 FOR f=1 TO 20  PRINT PAPER
9, INK RND*3+2,AT RND*2+18,RND*2
2+8 CHR$ (RND*2)+144)  NEXT f
295 RETURN
296 LET x=10  LET y=15
297 FOR f=1 TO 100  PRINT AT x,
y, INK 5,
298 LET x=x+RND*1.5-RND*1.5  LE
T y=y+RND*1.5-RND*1.5  LET x=x-(
x>17)+(x<1)  LET y=y-(y>30)+(y<8
1
299 NEXT f  RETURN
300 LET x1=x  LET y1=y  PRINT A
T x,y,
305 LET x=x+(INKEY$="6" AND x<1
7)-(INKEY$="7" AND x>1)  LET y=y
+(INKEY$="8" AND y<30)-(INKEY$="
5" AND y>0)  IF y<>y1 THEN LET b
$=CHR$ (y1-y+150)
306 IF x=INT (wx+.5) AND y=INT
(wy+.5) THEN GO TO 950
307 IF x=INT (a+.5) AND y=INT (
b+.5) THEN GO TO 900
309 IF ATTR (x,y)=37 THEN GO TO
850
310 IF ATTR (x,y)<>36 THEN LET
x=x1  LET y=y1
315 IF RND>.5-l THEN PRINT AT R
ND*16+1,RND*5+0
320 PRINT AT x,y, INK 2 b$
321 LET a1=a  LET b1=b  PRINT A
T a,b,
330 LET a=a+l*(a<x AND ATTR (a+
1,b)<>37)-l*(a>x AND ATTR (a-1,b
)<>37)  LET b=b+l*(b<y AND ATTR
(a,b+1)<>37)-l*(b>y AND ATTR (a,
b-1)<>37)
331 LET a=a+(a<1)-(a>17)  LET b
=b+(b<0)-(b>30)
335 LET b2=b  LET a2=a
338 IF a=x AND b=y THEN GO TO 9
00
350 PRINT AT a,b, INK 0, E
360 LET wx1=wx  LET wy1=wy
370 PRINT AT wx,wy,   LET wx=
wx+RND-RND  LET wy=wy+RND-RND  I
F ATTR (wx,wy)<>36 THEN LET wx=w
x1  LET wy=wy1
380 PRINT AT wx,wy, INK 1, D
390 GO TO 300
850 FOR f=10 TO -11 STEP -2  BE
EP .05 f  BEEP .05 f+2  BEEP .05
f+3  NEXT f
860 PAUSE 30  BORDER 0  PAPER 0
 INK 7  CLS
870 PRINT "Birds can't swim wi
th a broken wing."
880 GO TO 980
900 FOR f=20 TO 0 STEP -1.5  BE
EP .05 f  BEEP .1 30  NEXT f
910 PAUSE 30  BORDER 0  PAPER 0
 INK 7  CLS
920 PRINT "  The cat needed a m
eal too..  You needed to eat
";10-sc;" more worms  to mend y
our wing."
930 GO TO 980
950 LET sc=sc+1  LET l=l+.1  IF
sc 10 THEN GO TO 960
955 PRINT AT 4,4, INK 7, PAPER
0, BRIGHT 1 sc  FOR f=1 TO 17  P
RINT AT f 0,
        NEXT f  GO TO 100
965 PAUSE 30  BORDER 0  PAPER 0
 INK 7  CLS
970 PRINT "Your wing is mended
and you can fly back to your nes
t."
980 PRINT "Another game (y/n) ?
"
985 INPUT g$  IF g$="y" OR g$="
Y" THEN RUN 90
987 STOP
990 CLS   PAPER 7  INK 0  BORDE
R 4  CLS   PRINT TAB 8, THE EARL
Y BIRD "   Good morning, this m
orning you are a bird.A poor inj
ured bird  helpless on the groun
d because  your wing is broken.
           Somewhere there are
ten  little worms waiting to be a
te. But    there is also a cat.
The cat is likely to begin with b
ut speeds  up through the game.
           There is a puddle in
 the lawn  that must be avoided
but this   soaks into the ground
 slowly."
991 PRINT "  To move use keys
5 to 8."
992 PRINT "  Press any key to s
tart."
998 IF INKEY$="" THEN GO TO 998
999 CLS   RETURN
```

Early Bird
by Richard Evans

Prime Number

on Vic20

This program works on any Vic20 and many other machines with the minimum of adjustment.

The user types in a number above 1 and the computer will then proceed to work out all the prime numbers between 1 and your number. The results will be printed out on the screen unless the following adjustment is made to print it out on the printer

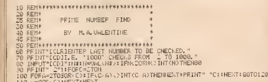
```
add     85 OPEN 1 4:CMD1
change  120 PRINT#1:CLOSE END
```

Other machine users (ie the Sinclair ate command will have to be inserted to 1) Open the printer command channel in line 85 and 2) Close the printer command channel in the line 120

Other machine users (ie the Sinclair ZX81 and Spectrum) will also have to delete the cursor commands in lines 60, 70 and 80

Program notes

Line
- 60 (Cursor command — Clear Screen) asks for the user to type in a number
- 70 (Cursor command — Cursor Down) demonstrates what the number shows
- 80 (Cursor command — Cursor Down) INPUTs the number and checks to see whether it is valid
- 90 PRINTS the first prime number (a 2) and starts the FOR-NEXT loop
- 100 Checks to see if the number is prime and if it is PRINTs it.
- 110 Identifies that the number is not prime
- 120 Terminates the program



```
10 REM*******************************
20 REM*                             *
25 REM*      PRIME NUMBER FIND      *
30 REM*                             *
40 REM*       BY M.A.VALENTINE      *
45 REM*                             *
50 REM*******************************
60 PRINT"[CLR]ENTER LAST NUMBER TO BE CHECKED."
70 PRINT"[CD]I.E. '1000' CHECKS FROM 1 TO 1000."
80 INPUT"[CD]";N$:N=VAL(N$):IFN<2ORN<>INT(N)THEN80
90 PRINT" 2";:FORC=2TON
100 FORA=2TOSQR(C):IF(C/A)<>INT(C/A)THENNEXT:PRINT" "C;:NEXT:GOTO120
110 A=SQR(C):NEXT:NEXT
120 END
```

Prime Number
by M Valentine

Adventure Competition

Write an adventure game and win a Commodore 64!

***Popular Computing Weekly* is offering a star prize of a Commodore 64 for the best adventure game written for any home micro — PLUS — a special prize of a Vic20 for the best essay on an adventure theme — PLUS — for the next 10 runners-up, two Commodore adventure games**

Each week during May *Popular Computing Weekly* will publish a coupon — simply cut out any three and send them in with your entry

The best adventure games are ideally a combination of action and logical riddles. For instance to open a door the player should not merely have to find the magic word but have to solve a puzzle in order to progress to the next location. Good graphics obviously enhance a program — and we'll be looking for a game that makes imaginative use of graphics although that does not mean that a text-only program will be eliminated

Other things we will be looking for are the surprise twists that make a program worth coming back to again and again.

And remember don't make your game too difficult in the early stages — adventuring novices should have a chance to get some way into the game before getting stuck!

For those of you submitting scenarios with your program think of it as a guide line for a programmer. Draw a map showing location objects and other important details of your adventure and compile a dictionary of key words that your program will accept

If you do not want to write a full blown adventure game you can still enter the competition by writing an essay (up to 2 000 words) on an original adventure theme. A Vic20 will be awarded to the essay which describes the most original and interesting adventure game

The competition will be judged by Tony Bridge and *Popular Computing Weekly* editor Brandon Gore

PRIZES
1. Commodore 64
2. Vic20
3. Two Commodore adventure games of your choice for 10 runners up

HOW TO ENTER

All you have to do to enter this competition is collect the coupons from three issues of the magazine and send them together with your entry (stating which machine your game is for) to
Popular Computing Weekly
Adventure Competition
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

RULES
1. Each entry must consist of your adventure or essay together with three coupons and your name and address
2. Closing date for the Adventure Competition is 30 June 1983
3. The judges decision is final
4. No employees of Sunshine Publications Ltd, or their families will be eligible to enter

Adventure Competition (4)

Name ______

Address ______

______

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SKI-SUNDAY Guide your skier down the forested course through the slalom gates avoiding the many hazards but watch out for the ice

POLARIS You are in command of a nuclear sub destroy as many enemy ships and planes with your missiles in 90 seconds, score 400 points and receive an extra 30 seconds on patrol

Both these games are in multi-colour with many sound effects and tunes £5.50

JACKPOT Own a fruit machine just like the real thing can you win the jackpot, you will be amazed by the graphics colours and many sound effects with nine different tunes, a full machine code program a very compulsive game £5.50

SWAG-MAN Chase the bullion van round the streets of New York picking up the swag but beware you must defuse the time bombs to gain extra time and fuel full colour and sound effects a very original game requires 3K expansion £5.94

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CHARACTER EDITOR With our own window facility £4.50

Full documentation with all utility programmes

COMMODORE 64

LUNAR RESCUE Our own machine code version of that popular arcade game £7.50

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Other software available for the VIC and Commodore 64 send for free brochure

CHEQUES/POs TO:

MR CHIP SOFTWARE

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WANTED Good quality software top royalties paid

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ZOK'S KINGDOM

[illegible] graphics and M/C movement.

KB/JS | VIC 20 | 16K | £6

DOTMAN

[illegible] All M/C game complete with running and highest scores and tunnels

JS/KB | VIC 20 | Unexp. | £6.00

TRADE ENQUIRIES WELCOME, GENEROUS DISCOUNT

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We are looking for top class writers to join our growing software team. If you have written a quality game for VIC 20 SPECTRUM DRAGON 32 ORIC 1 or COMMODORE 64 then contact us. We pay top royalties for accepted programmes.

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XENO II

[illegible] Truly a game for all arcadians

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CAVERN FIGHTER

All M/C version of SCRAMBLE [illegible] 15 skill levels

KB/JS | VIC 20 | unexp. | £6

CRAWLER

All M/C version of Centipede [illegible]

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PHARAOH'S TOMB

[illegible] A multi-screen big graphics adventure with M/C movements

KB | VIC 20 | 16K | £6.00

GALACTIC ABDUCTORS NEW

[illegible] your mind with its graphics and sound effects.

JS | VIC 20 | 16K | £7.00

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Popular arcade game. All machine code [illegible]

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DRACULA

Count Dracula is asleep somewhere in his castle [illegible] A multi-screen graphic adventure

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TINY TOT'S SEVEN

[illegible]

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3D TIME TREK NEW

[illegible] spectacular 3D graphics and real arcade action

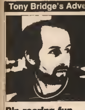
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KRAZY KONG

[illegible] Complete with high score table

KB/JS | VIC 20 | 16K | £7.00

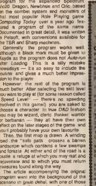
Tony Bridge's Adventure Corner



Rip-roaring fun

As the water imp slashes at your sword-arm you nimbly avoid its thrust and in return aim a blow at its head — it staggers and you quickly follow up with another cut at its body. It falls dead at your feet. As you stagger away, a barrow wight appears and hurls a lightning bolt at you — luckily it misses and you retaliate with a well-timed sleep spell which vanquishes the ethereal monster. You live to fight another day, warrior, with your stamina renewed and a few more experience points.

If all this is familiar to you, then you have probably played *Dungeons and Dragons*. *The Valley*, from Kayde Software, is a program for the expanded Spectrum, Vic20, Dragon, Newbrain and Oric based on the combat system and monsters of that most popular Role Playing game. *Computing Today* over a year ago featured a program of the same name. Documented in great detail, it was written in Petsoft, with conversions available for the TSR and Sharp machines.



Generally, the program works well, although a black mark must be given to Kayde as the program does not *Auto-run* after *Loading*. This is a silly mistake nowadays — it's so easy to include the routine, and gives a much better impression to the player.

However, the rest of the program is much better. After selecting the skill level you want to play at (for some reason called "Speed Level" — there's no speeding involved in this game!) you are asked to choose a character. In true *D&D* fashion you may be wizard, cleric, thinker, warrior or barbarian — they all have their own affect on the later stages of the game, and you'll probably have your own favourite.

Then the first map is drawn. A winding road, the "safe path", crosses a barren landscape which contains a few swamps and forests. At either end of the road is a castle, a refuge at which you may rest and rejuvenate and to which you must return treasures found along the way.

The article accompanying the original program went into the background of the scenario in great detail, with one of those high-flown gothic stories of magic and chivalry. Unfortunately, there is none of that here.

The general atmosphere, however, is medieval — you can tell that because of the language (there are lots of "thees" and "thous"), and the shape that represents you, a shield with white cross.

While on the safe path, no harm will befall you, as no creature will attack — but that's rather boring, and you certainly won't progress that way. Step off the path and you're fair game for any passing creature. The object is to move across the map picking up experience points along the way, as well as treasure, of course, like any self-respecting knight. Each swamp and forest contains temples or lodges with several rooms, in some of which may be secreted the various gems and hoards of gold. These buildings are surrounded by lakes, inhabited, naturally, or rather unnaturally, by watery monsters.

The database for monster generation contains such lovely things as ringwraiths, harpies, minotaurs and wyverns amongst many others. The monsters are of two sorts — natural or supernatural. You must make the appropriate reaction to each kind, by using one of three kinds of spells, or using your sword to hack at a specified part of the creature.

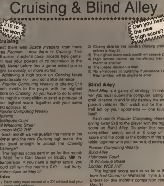
The ultimate aim of the adventure is to go from lowly Monsterfood (rating #1) through Necromancer and Paladin to Master of Destiny (rating #28). To get your rating, you must return to one of the castles with the various rings and helms that you've picked up in your travels.

On the H-scale (where Melbourne House's *The Hobbit* is assumed to have an arbitrary score of 20), *The Valley* must rate about 17. A vital point is lost because of the lack of the presentation at the start and for having no *Auto-run*. Another point off for not having a *Save* routine. This is fairly serious, as the game will obviously take many hours to play.

However, the reason for losing the third point (the program is written in slow Basic) may actually help you. The lack of speed is regrettable, though you can live with it, but being written in a high-level language the program is easily adaptable. It should be fairly easy to write in your own *Save* character and program routine.

So, although the program shows its age, the adventure is nevertheless going to give you hours of non-cerebral, bash-about, rip-roaring fun! ■

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.



Cruising & Blind Alley

£10 to be won

Can you beat the new high score?

Cruising

First there was *Space Invaders*, then there was *Pacman* – now there is *Cruising*. This all action, machine code, arcade type game will test your powers of co-ordination to the limit. Never before has a game asked you to think so quickly or move so fast.

Achieving a high score on *Cruising* takes considerable skill and not a little patience.

Popular Computing Weekly is offering £10 each month to the player with the highest score on *Cruising*. All you have to do to enter this month's competition is send a print-out of your highest score, together with your name and address, to:

Popular Computing Weekly
Cruising
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

Each month we will publish the name of the winner and the new *Cruising* high score. Are you good enough to accept the *Cruising* challenge?

The highest score sent in so far this month is 5868 from Carl Doran of Skidby Mill, N Humberside. If you have a higher score, you could still win this month's £10 — but hurry, entries close on May 31.

Notes

1) Each entry must consist of a ZX printout and your name and address.
2) Closing date for this month's *Cruising* challenge entries is May 31.
3) The highest score each month will receive £10.
4) High scores cannot be transferred from one month to another.
5) The judges decision is final.
6) No employees of Sunshine Publications Ltd or their families will be eligible to enter.

Blind Alley

Blind Alley is a game of strategy. In order to win you must outwit the computer, using your craft to fence in and finally destroy the enemy pursuit vehicles. But watch out for the solid trail left by your opponents — one touch is fatal!

Each month *Popular Computing Weekly* is giving away £10 to the player with the highest score on *Blind Alley*. To enter this month's competition simply send in a copy of your score and the code at the bottom of the score table, together with your name and address, to:

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SPECTRUM OWNER needs more software. If you have some to sell telephone Rainham (Essex) 22950 after 6.30 pm or weekends.

AUTHORS WANTED

If you can write programs, business, utilities, games for New Brain, Commodore 64, Epson HX-20, Atari 400/800, contact us for best prices.

Phoenix Publishing Association
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We are seeking good quality original de-bugged games and utility programs for the ZX81 (1K—16K). We are offering an attractive remuneration package for the right program base. Write to us at:

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ZX81 16K, DK'Tronics keyboard and graphics Rom, over £200 software, two books, Abacus controller and all all used £130. Tel Winscombe 3145 after 4.30



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VIC20 + COMMODORE 16K Ram pack + C2N cassette unit Still under guarantee Bargain at £180 ono Tel Tamworth 288393 after 5 pm

ATARI 400 16K + basic cartridge £128 as new Tel (0202) 617342

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VIC SOFTWARE SUPER EXPANDER, Vic graphics £25 trade Bug-Byte rabbit tapes £10 Voodoo Castle £15 three-slot Motherboard + 16K £30 stack light pen £15 Rabbit Myriad plus Chargel 20 £10 Contact P Heyl 6 Whitefield Road Helbury Hants

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16K SPECTRUM with lots of software books print and platter £130 Tel Bedford 212946 after June 4

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ZX81s for sale

16K ZX81 with Redditch keyboard £60 of software magazines and also manuals. Asking £80 ono Tel 0292 89280 Ayr Scotland

ZX81 1K + software manual leads four months old Upgrading to Spectrum £36 Tel Llanboidy (099 46) 211 after 4 pm

ZX81 16K with Fuller keyboard books and software £100 Tel 061 327 5629 after 6 pm

16K RAM PACK for ZX81 £26 Brand new under guarantee from April Unused Tel Stubbington 662787

16K ZX81 with DK'Tronics keyboard printer extra paper AGS joystick converter + one joystick high resolution graphics pack £90 of software + magazines £100 ono Tel 01-883 3653

ZX81 16K with Dean Electronics keyboard + Q5 sound board + motherboard + £50 of software + books worth £130 sell for £90 Tel 01-854 2867 after 6 pm

ZX81 1K excellent condition all leads power pack, manuals some software £30 for quick sale Tel Mr Leete 0742 74111 (office hours)

ZX81 16K with full size keyboard and lots of software £80 Tel Croston 600263

16K ZX81 with Prism keyboard + manuals and leads + four tapes and a few magazines £60 Tel 499-4374 (after 5 pm)

ZX81 + 16K Quicksilva soundboard/motherboard DK'Tronics graphics board Can be sold separately £90 Tel Tunbridge Wells 28101

16K ZX81 with Redditch keyboard Abacus controller printer and books + games £75 Tel Reading 475828

ZX81 + 16K, still boxed + over £100 of software £100 ono Tel Evesham 2887

16K ZX81 with File 80 keyboard and beginners code £65 Tel Crawley 883922

ZX81 SINCLAIR 16K with manuals and leads etc add £40 of software £85 Tel 0454-612855 (after 5 pm)

ZX81 + unused 16K + manual etc Pro keyboard + £45 software £80 Tel Dave Crewkerne (0460) 74887 after 6 pm

ZX81 + 16K Ram DK Tronics keyboard all leads manual and books with a lot of software £100 ono Tel Harlow 31079 after 7 pm

ZX81, 16K, machine code book, three books software Scramble 3D Defender three adventures magazines £200 Yours for £130 ono Tel 01 8?? 8019 (after 5 pm)

16K ZX81 with soundbox 15 tapes all leads etc Good condition £98 Tel 387-6130

ZX81, 16K trade games tapes for £48 Tel Newton-le-Willows (Merseyside) 21444

ZX81, 16K with all leads lot of software including Frogger 3D Monster Maze and Scramble Tel Leeds 652380 after 5 pm

ZX81, 1K with keyboard and software £45 ono Tel 0241 52507

ZX81 16K and Zonx 81 soundpack + 10 tapes 20 magazines + two books, £80 ono Tel (Crayford) (2)524-889

ZX81, 16K, printer and paper manual books worth £140 £100 ono Tel Dudley 236925 (after 6 pm)

ZX81 1K + keyboard £35 Tel 01 803 5644

Dragons for sale

DRAGON 32 8 months old cassette recorder joysticks + software £200 Tel 0702 545575

DRAGON 32 with cassette recorder 2 joysticks parallel printer interface cable manuals books magazine articles + reviews software blank tapes worth £300+ sell for £225 Tel Coventry 818579

DRAGON 32, 6 months old still in original box £30 of games software Tel Stanford-le-Hope 642835

DRAGON 30 + joysticks 22 games worth £420 in excellent condition will sale for £235 or will sell software separately Tel Hull 52572

DRAGON 32, joystick, 22 tapes 1 month old value £420 yours for £236 ono will separate Mr Carr Hull 507883

DRAGON 32, joysticks recorder cables leads 6 cassettes Berserk cartridge just over £300 sell for £200 ono Tel Chelmsford (0245) 82006

DRAGON 32, mint condition + joysticks £150 software + manuals/books, £210 ono Tel 0422 66009 after 6 pm

DRAGON 32, 1 week old pair of joysticks 1 games cartridge machine code book, £300 or exchange for BBC Model A Tel 0602 215910

DRAGON 32 £100 of software joysticks books worth £360 £280 ono Tel Stoke-on-Trent (0782) 413759 (8 pm)

DRAGON 30 + Tandy colour printer and cable £260 Tel 8??1 3924 (daytime)

DRAGON 32, 6 months old complete with all leads, cassette recorder instruction manual books joysticks, 7 games £180 Tel 0793 763960

DRAGON 32, 6 months old + 2 joysticks Berserk cartridge 6 games (Donkey King Phantom Slayer etc) 3 Tandy books games book magazines (Coconews) (3) Rainbow (3) Dragon User all worth £300+ Could deliver £220 ono Tel Leeds (0532) 622004

Tandys for sale

TRS 80 COLOUR COMPUTER, 32K VCR recorder joysticks cassette + cartridge software learning kit books etc, cost nearly £700 accept £360 ono Tel 061-370 2163

TANDY CGP 115, colour graphics printer plotter with spare paper + pens £120 Tel Coventry 616579

SWAP ADVENTURELAND for any other Vic adventure except for Pirate Cove Tel 041-642 8146

TANDY TRS 80 Model 1 Level 2, 16K, CPU + joystick + software £125 ono Tel 0835 21418 after 8 pm

Commodores for sale

COMMODORE Vic 20 + C2N cassette unit + 4th language cartridge £80 ono Tel Guildford 576252

COMMODORE 64 with the latest model tape recorder (C2N) and reference guide manual and 11 games worth nearly £100 Total value about £520 guarantee — sale for £470 ono Tel 01-450 8658

SPECIAL VIC20 6K internal memory + 8K expansion high resolution Ram machine code monitor C2N tape books joysticks software including Backgammon Adventureland £225 ono Tel 061-4313553

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VIC20 + cassette recorder joystick + software swap for 48K Spectrum or £130 Tel 0536 741851

COMMODORE 64 with tape and software + manual and leads £275 ono Tel 0645 828549

VIC20 + tape recorder + programmes + Programmers Reference Guide + 22 copies of Personal Computer World (in binders) in very good condition Cost £280 Accept £120 or very near offer Tel 01 866 6321

VIC20 CARTRIDGES to sell Jelly Monsters Omega Race Starbattle Road Race Radar Rat Race £15 each Adventures include all five Scott Adams £17 each also Vic20 software to exchange Tel 01-387 8751

COMMODORE 64 + C2N cassette recorder complete with joysticks and software £330 ono Tel Malvern 61602

VIC20, C2N cassette unit, etc, £130 Tel 01-407 2687

VIC20 with cassette deck super expander five cartridges cassettes joystick and books — for £250 worth £370 — call Tenby 2139 after 4.20

VIC20 plus C2N cassette unit 16K Ram super expander cartridge books, manuals — for £150 — call 01 558 5631 after 6 pm.

COMMODORE 16K RP £30 Tel Leigh 675514

EX-DEMONSTRATION MODEL VIC20 (under guarantee) plus C2N cassette deck. Also software + joystick mint condition hardly used, £150 Tel 01-841 3342

VIC20, 16K RP + cassette recorder £160 Tel Tamworth 288393

VIC20 plus C2N cassette joystick as new £130 Tel 0536 741831

VIC20 cassette three cartridges software joystick Basic PI excellent condition worth £300 accept £179 Tel 02993 5548

COMMODORE 64, £280 ono Only 2 months old Tel Tonbridge (0732) 361920

VIC20 + 3 and 16K, Programmers Reference Guide VIC Revealed Sargon Chess £155 Tel (0732) 361920

VIC20 8K Rampack little used £32 ono Tel 061 881 4391 (Manchester)

SPEECH SYNTHESISER for the Commodore VIC20 swap for extra memory Tel 0772 25366

VIC20 just under guarantee with cassette recorder and dust cover + mags + games cassette £170 Tel 021 327 4866

COMMODORE PET 4032, 9 inch screen tool kit visicalc lots of books cover 18 months £370 Tel 01-440 1553 01-445 7771

VIC20, 21K cassette deck, joystick books, 9 cartridges including Jelly Monsters Omega Race Crates 30 cassettes including Llamasoft, all original software no pirate copies, cost new over £600 £260 for quick sale Tel 0702-201837

VIC20 GAMES, Pirate Cove, Mission Impossible Mutant Herd and Avenger — cartridges £15 each Telephone for other games including Quackers Scramble Blitz Vicmen etc all under £8 each Tel Sarnden 270081

VIC20 SUPER EXPANDER £25. Tel 01-808 6450

COMMODORE 64 + C2N cassette player University Lecturer must sell £350 Tel Bracknell 20539

VIC20 + cassette Adventures + Adventureland cartridge Vicmen Amok, Asteroids Vic Panic, over £80 other games + utilities program reference guide three metre video cable extension all in good condition £188 ono Tel Bolton (0204) 706892 (evenings)

VIC20, four months old swap for ZX Spectrum Tel Tenby 3042

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VIC20 + tape recorder + 8K Ram + joystick + £90 software + Vic Innovative Computing + Vic Revealed, £150 Tel Basildon 45188

VIC20 five months old 16K memory + cassette recorder, £150 Tel (Cardiff) 565764

VIC20 + 3K + 16K + tape deck, Introduction to Basic 1 & 2 joystick maths and English revision cassettes £75 of software five months old Excellent condition £180 Tel 0684-820561

VIC20 8K Ram £35 3K Ram £15 Super Expander £19 Vic Stackcom kit £10 Introduction to Basics Part 1 £8 Sargon II Chess cartridge £18 The Count cartridge £15 Other software available Tel (Hurlingden) 0460-72170

VIC20 COMPUTER + C2N cassette recorder + 16K Ram £100 Tel Taunton 56726

VIC20 + C2N cassette recorder 4-slot motherboard 16K Ram expansion Super Expander machine code monitor joystick dollymonsters lots of software including The Invasion Starquest, Chess and many more, £320 Tel (0622) 702644 (after 5 pm)

VIC20 HI-RES, £18 ono Tel 01-579 2129 (after 6 pm)

COMMODORE VIC with tape unit, complete dust covers set, joystick all manuals Rose Race Ram cartridge much tape software original Bugbyte Vicmen and Blitz Excellent condition £320 ono Tel Padgate 810490 (after 5 pm)

VIC20 C2N CASSETTE DECK, 16K memory exp joystick two cartridges and software + magazines £260 ono + five months guarantee Tel 01-317 0898 (after 6 pm)

VIC20 plus C2N cassette deck (with one year eight months guarantee) plus software and joystick. Ideal for £150 Tel 01-941 3342

TAPE DECK + joystick for Vic20 + two games Pane and Alien Blitz All brand new will accept £48 Tel Hamilton 0698 428016

VIC20 CASSETTE DECS, synthesiser tape + book and games, £150 Tel 340-9611 (ask for Kevin)

VIC20 + C2N cassette drive and a Rom cartridge £110 Tel D Hellier Barry 744067

VIC with cassette unit + 8K + 3-slot expander Introduction to Basic Part 1, joystick books including Vic Revealed, software £155 Tel Billericay 58854

Ataris for sale

ATARI VCS with six cartridges £85 Tel 585 8317

ATARI 400 48K cassette unit, disk drive over £800 of games utilities on cassette + disc, £190 of reference books £800 ono Tel Basingstoke (0256) 55464 (evenings/weekends)

ATARI VCS + eight cartridges including Amidar Spiderman Empire Strikes Back Demon Attack, Frogger Worth £340 sell for £180 ono Tel 061 2267582 (after 4 pm)

ATARI 800 + 410 program recorder joysticks manuals including De Re Atari programs etc five months old Cost £530 sell £395 Tel Eastbourne 641719

ATARI VCS, seven months old including PacMan Space Invaders and Combat £70 Tel 08406 5645 (evenings)

48K ATARI 800, with disc-drive cassettes and joysticks + various games Value new £900 selling complete system + manuals for £660 Tel Southend (0702) 616881

DEMON ATTACK for Atari VCS to exchange for Parker Star Wars cartridge Tel 04862 70318.

ATARI VCS + two cartridges £99 95 ono Tel Bookham 52889 (after 5 pm)

ATARI VCS + two cartridges £90 Tel Cobham (Surrey) 3503 (after 5 pm)

ATARI VCS + six cartridges will swap for Spectrum or Vic20 or sell for £125 ono Tel 025-871 3445 (after 4 00 pm)

ATARI VCS, as new Space Invaders and Combat, Atari bulletins, £75, Tel Hartlepool 493694

ATARI 800 + recorder Basic cartridges joystick, Centipede Missile Command Defender Asteroids IV) + manuals four months old. Very good condition £300 ono Tel 01-592 7045 (after 6 pm)

Acorns for sale

BBC MODEL B with joysticks and software £300 Tel Huntingdon (0480) 880803 (evenings)

TRS 80, Level 2, 16K, green monitor manual numerous books/tapes £250 ono Tel Leamington Spa 28506 (before 8 pm)

ACORN ATOM, Acorn built 12K + 12K lots software £125 Tel Cooper, 01-504 8210 (evenings)

For sale

SWAP ATARI 800 + 410 recorder joysticks books + manuals including De Re Atari program etc 5 months, for BBC B Tel Eastbourne 641719 evenings

BUY, SELL, part-exchange or swap a Commodore 64 game And are sell games from price range of £2.50 to £6.95 Tel 01-450 4856

RETAILER SEEKS WIDER RANGE of software stock for Dragon/Spectrum/ZX81 Oric Peaksoft, 7 Hawthorn Crescent Burton-on-Trent.

SHARP MZ 80K with Pascal and Basic tapes as new £310 Tel 0926 59658

LOTS OF VIC20 software Tel Peter 677 2476

SWAP VIC20 Count Adventure cartridge for Mission Impossible Johnstone (Renfrewshire) 21586

MICROTAN 65 6K Ram Basic Rem and kit Rom full keyboard system rack, lots of games, programs + word processor £370 Tel Hollington (088926) 221 (Staffs) Also Epson MX80 FT1 with connecting leads for Microtan excellent condition £270

SWAP SPECTRUM GAMES lots of all varieties including The Hobbit Cruising Slippery Sid Pimania and loads of others Also a ZX81 with 16K joysticks graphic Rom for £100 + lots of software Tel Penn 5726

£80 worth of ZX81 software for sale including 3D Defender Scramble Mazogs etc. Ring for details Tel 0460 74697

TEXAS TI99/4A cassette leads, joystick TI Invaders 6-months-old £160 or split. Tel 061 225 1338

16K RAM pack for ZX81 for £18 offers welcome Tel 01-722 7425 after 6 pm

ELFTONE tape recorder with 3-pin socket + counter suitable for Oric 1 £25 Tel 445 5969

EXCHANGE your software with me Send an sae to M A. Vaseline 101A Underdale Road Monkmoor Shrewsbury Shropshire SY2 5EF

SHARP MZ 80K 48K Ram, RTTY interface fitted transmitter and receiver software morse code decoder software nightly machine code software also other software books + magazines. Asking £630 ono Tel Atherton 881140

ORIGINAL SPECTRUM software for sale Escape £5 50 Ideas man £5 50 Night Flight £4 50 Spectral Invader £3 50 Time Gate £5 50 Drafts £5 50 Write to 30 Framfield Road Uckfield East Sussex TN22 5AN or tel 0925 2614 (Saturday between 12 am and 2 pm)

ATARI VHS tapes Pacman £20, Defender £20 Basketball £10 Skiing £10 Demon Attack £15 Space Invaders £15 Please ring 586 8161

INTELLIVISION + Soccer Basketball, Horse Racing Space Battle and Tennis cartridges excellent condition £150 Tel Kings Lynn 82234 (evenings)

DAI 48K improved keyboard user mags. £560 ono Tel 01-670 5909

TI99/4a 7 months old + cassette recorder + leads, £110 ono Tel 04865 2887

VIC SUPER EXPANDER cartridge £25 Tel 808 6450

BINITONE COLOUR TV GAME + Subuteo table soccer + MB Logic 5 for a 1K or 16K ZX81 with leads Tel Neil 051-608 6126 evenings

SWAP OR SELL VIC20 GAMES. Tel 01-579 2129 and cartridges

PHILIPS G7000 with three cartridges little used in mint condition cost £111 will sell for £60 Tel Lytham 733077

LINX COMPUTER, six weeks old unwanted gift, £220 Tel Doncaster 856528

SPECTRUM 48K plus cassette recorder 3 months old £180 Tel Crawley 513808 (after 6 pm)

SWAP, Apple II Euro + for any software Tel Harrow 8527375

20 INCH b/w television excellent picture perfect working order £15 Tel 051-3398894 (after 4 pm)

SWAP, Vic cartridge Adventure Land for Count or Voodoo Castle Tel 05432 22462

CBM, 16K Ram Avenger Sargon II Chess 3 Stick Intro to Basic I and II innovative computing pack new £180 £100 ono Tel 074488 2325 (after 6 pm)

RD Digital tracer mounted on a board £40 Tel 0274-727965

SWAP Spectrum Football Manager for Pimania or Black Crystal Adventure Tel 0632-673203 (after 5 pm)

VIC 4TH cartridge swap for Super Expander or switchable Ram or 2 games cartridges Tel Norwich 0603409534

SWAP 48K Spectrum for 16K ZX81 plus £20 Tel 01-460 4603

VIDEO MASTER Star Chess, £75 Tel 01-304 1819 (after 4.30 pm)

FURTHER PROGRAMMING for ZX Spectrum (Shaw) £4.50 + Cartridge Colour Collection (book + tape) £5 Tel 01 346 0586

MISSION IMPOSSIBLE for Vic 20 £15 Donkey Jump Wacky Waiters cassettes £10 Tel 01 589 9568

VIC 20 software to swap Tel 01-208 9649

WARRIOR + Star Trek for 16K ZX81 (Marconi Software) £5 each Tel 0908 568216

CARTRIDGES including Demon Attack Sub Hunt Tron 14 in all (Mattel Television) from £10 each Tel 041-882 4786

TI 99/4a unwanted Christmas present includes speech synthesiser speech editor module TI Invaders module Munchman module joysticks dual cassette cable audio cassettes and magazines All for £250 Tel Doncaster 0302 723571

MZ 80A, as new + software books etc £395 or exchange system 01-808 1490

ADULT DRAGON owner wishes to exchange tapes and cartridges. Epromas large and varied selection from the serious and Teletext through to games and learning tape/cartridge Tel Staines 58707 (after 9 pm)

OVER £100 SOFTWARE, will sell for £70 or will swap for other originals Tel Chester (0244) 378549

SPECTRUM software swap or sell Tel Chester 378682

VIC 20, Mission Impossible Type-a-Tune + Cosmiad swap for the Vic rals monitor cartridge Tel East Kilbride 42863

48K LINX, 2 weeks old 1 year guarantee all leads PSU books manuals + software all in perfect condition £220 no offers will swap for BBC Model A. Tel Waltham Cross 26173

VIC 20 cartridges for sale, includes Gorf Chess £15 each also Star Sat the Road Race + many many more £12 each Tel 01 674 4122

VIC20 CARTRIDGES Jelly Monsters, Omega Race Radar Race Star Beds Rat Race and Meteor Run — £14 each Scott Adam's Five Adventures for £17 each Rabbit Haw 6 including Orbis Linkwell £10 Call 01-387 8751

SUPER STAR multi mode CB transceiver exchange for printer compat after for BBC Tel Mr Guthrie Erith 33474

ARTHON EXPANSION UNIT, for Vic20 £65 ono Tel 01-650 8701

5 SPECTRUM BOOKS inc Spectrum Handbook, £20 Tel 0555-71502

VIC20 CASSETTE, Pirate Cove swap for Vodoo Castle or Count Dracula Tel Atherton 895119

SWAP, Arfon 8K expansion pack + many 6K games for your Commodore 6K pack. Tel Stevenage 811604 (after 7 30 pm)

SHARP 1786K 48K, Ram manuals games tapes etc, £250 Tel Peterborough 204255

SWAP, Atari 800 + 410 program recorder joysticks manuals in De Re Atari programs etc 5 months old for similarly equipped BBC computer Eastbourne 641719

HOMING PIGEONS + Booking for the 16K ZX81 exciting programs written in Basic For both games on one tape send a cheque to the value of £2 to C Hume 36 Long Craigs Terrace Kinghorn Fife KY3 9TD

64K TUSCON SYSTEM Z80A, working at 4 mega CPM disc system with 180K formatted including CPM S100 cost £1 550 sell for £1 000 or swap for something useful Tel 456 1949

ATARI SOFTWARE for Atari 400/800 3 cartridges Star Raiders Missile Command Asteroids the three £85 Protector (cassette) £12 Tel 0702 201927

140 COMPUTER MAGAZINES all popular titles sell for £13 or swap Dragon Forth. Tel Ware (0920) 68264

INTEL SYSTEM development kit for 80/85 any offers Tel Layer 342 after 7 pm

SHARP MZ, 80K personal computer 48K model Immaculate condition hardly used as new cost £400 selling for only £350 ono after includes dust cover green screen and many programs Tel 061 773 3445

Wanted

WANTED BBC MICRO COMPUTER Model A or B must be in good condition Tel Havant 473068

VIC20, swap Omega race for any adventure cartridge Tel Stevenage 0438 4066

WANTED BBC MODEL B, plus cassette and manuals etc pay up to £320 Tel Worthing 0903 5792

WANTED, FELLOW SPECTRUM OWNER, living in or around Harpenden for exchanging software and ideas Tel Harpenden 69152 (after 5 pm)

I WANT A BBC MODEL B, Instant cash paid Tel Harpenden 69152 (after 6 pm) with full details of your ideas

WANTED BBC MODEL B with or without accessories and software Tel 01 741 1746

WANTED, Cassette Recorder Jack, Din Plugs Counter Tel Chester (0244) 378549 (6—8 pm)

WANTED, BBC 32K A or B Microcomputer Must be in good condition Tel Coventry (0203) 504485 (after 5 pm)

SWAP VIC20 Asteroids for other Vic20 games Tel 0341 260726 (after 6 pm)

WANTED BBC MODEL B and software offer exchange of Yamaha 250cc 1981 US Custom motorcycle 1 000 miles only Immaculate Tel 0443 671227

NEW RELEASES

TEEING-OFF!

Vic Golf uses defined graphics and split screen techniques to enable you to play the game on your micro

The game requires 3K extra memory and a joystick Those who have brought material from the manufacturers of the tape — CP White — should note the new address given below

Program *Vic Golf*
Price *£4 00*
Micro *Vic20 (+3K and Joystick)*
Supplier *CP White (Services)*
52 Northfield Ave
West Ealing
London W13 9SY

KRAZY KONG

Krazy Kong is a ZX81 version of the popular arcade game of the same title

The game features a pyramid you must climb, whilst knocking out the supports for *Krazy Kong* as you go You reach him by climbing various ladders — and avoiding the rocks and barrels which are thrown at you

The game has three screens and, it is claimed all the features of the original

Program *Krazy Kong*
Price *£3 95*
Micro *ZX81 16K*
Supplier *Personal Software Services*
452 Stoney Stanton Rd
Coventry CV6 5DG

INTO GEAR

Although lagging behind the seemingly endless range of books produced for the Spectrum the Dragon book market is gradually getting into gear

The Power of the Dragon is a new book from Microsource which uses 30 programs to illustrate different programming techniques Each program has a line by line commentary, explaining how the program works

Book *The Power of the Dragon*
Price *£5 95*
Micro *Dragon 32*
Supplier *Microsource*
1 Branch Road
Park Street
St Albans
(+50p P+P)

PROCESSED

Although *Telewriter* looks like becoming the flagship wordprocessor for the Dragon, its price (over £40) may lead people to look elsewhere

Textstar is a Dragon wordprocessor which offers most of the usual wordprocessor functions like line insertion, find and display string, etc

Total file length is up to six pages of A4 text It is one of a developing range of Dragon programs from Personal Software Services

Program *Textstar*
Price *£12 95*
Micro *Dragon 32*
Supplier *Personal Software Services*
452 Stoney Stanton Rd
Coventry
CV6 5DG

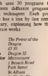
PACKAGE DEAL

Ramtop is a company offering a complete package for the small business

The package consists of three cassettes for the 48K Spectrum — a sales journal a sales ledger and a purchase ledger The three cassettes come with an explanatory booklet and incorporate routines which enable them to be used with a ZX printer

Program *DIY Book Keeping*
Price *£24 95 per tape*
Micro *Spectrum 48K*
Supplier *Ramtop Software*
12 Minthorpe Rd
Burtonwood
Warrington
Cheshire

WORD GAMES!



Few single programs have had better advance TV coverage than *Scrabble* from Psion

For some reason this computer version of the popular board game has grabbed the media's attention — perhaps because the idea of a computer playing around with words has overtones of artificial intelligence

The cassette comes in a box with an explanatory booklet The rules of *Scrabble* are outlined as is the use of the computer One of the many options included in the game is a chance to see the computer thinking about its next move — this involves letters whizzing about as it searches through all the possible permutations

It is perhaps not surprising that such a likely best-seller comes at a luxury price — £15.95 — but then I suppose someone has got to be paid for typing in the dictionary of words the computer understands — there are over 11 000 of them

Program *Scrabble*
Price *£15 95*
Micro *Spectrum 48K*
Supplier *Psion*
2 Huntsworth Mews
Gloucester Place
London NW1 6DD

SPIDER'S WEB!

Horace and the Spiders is the latest edition to the *Hungry Horace* series

The plot sounds like a mixture of half a dozen arcade games put together Firstly, *Horace* has to climb the hills to the Spider mountains, jumping over the spiders that run at him Then, he must negotiate the spider bridge by using dangling threads as ropes, until finally he reaches the spider cave

Once in the cave, *Horace* can attack the spiders and make holes in their web *Horace* has four phials of serum which will protect him from spider bites

Psion is now describing this game as an adventure and it certainly has a complicated plot

What next I wonder — a 48K special *Horace enters Mastermind* perhaps?

Program *Horace and the Spiders*
Price *£5 95*
Micro *Spectrum 16/48K*
Supplier *Psion Melbourne House*
2 Huntsworth Mews
Gloucester Place
London NW1 6DD

SINGING PI!

Pimania was an extremely successful game when it was issued on the Spectrum — indeed it would probably be rated one of the very best games for the machine

It is now available for the Dragon 32 with most of the features of the original including an all singing and dancing PI man, a dreadful single on the reverse side, and of course valuable prize

Program *Pimania*
Price *£10*
Micro *Dragon 32*
Supplier *Automata*
65 Osborne Rd
Portsmouth PO5 3LR

SHOP COPI



What with all the advertisements anyone could be forgiven for thinking that *Catcha Snatcha* from Imagine Software had been out for some time — in fact, I have only just received a copy

In the game you are a store detective whose job it is to look after the premises Tasks include collecting lost property and lost children and even evacuating the store when bombs are found! All this in conjunction with looking out for shoplifters

The aim of the game is to retain the manager's confidence — this is expressed in a percentage derived from the number of written warnings received

Program *Catcha Snatcha*
Price *£5 50*
Micro *Vic20*
Supplier *Imagine Software*
Masons Buildings
Exchange Street East
Liverpool Merseyside
L2 3PN

FLASHING SCREEN

Salamander Software has issued a graphics package for the Dragon 32

The package facilitates use of the Dragon's graphics and enables text to be mixed with high-resolution, as well as various drawing routines

The program requires one joystick and uses a flashing screen cursor to position lines on the screen

Program *Graphics System*
Price *£9 95*
Micro *Dragon 32*
Supplier *Salamander Software*
27 Ditchling Rise
Brighton
East Sussex

1K GAMES

Many people who buy a ZX81 lament the fact that there is nothing they can buy for their machine unless they also buy the extra 16K Ram

However, Micromega is a company specialising in games for the 1K machines *Arcade Action* is a games pack consisting of *Greedy Gobbler*, a maze hunt game, *Extra Terrestrial* in which you are the stranded alien, and three other arcade type games

Program *Arcade Action*
Price *£4 95*
Micro *ZX81*
Supplier *Micromega*
230-236 Lavender Hill
London SW11 1LE



MEANIE HUNT

Bonka is a game for the Dragon 32 based on the popular *Space Panic* arcade game

Using the keyboard you must kill off the meanies by trapping them in holes dug with your hammer There are four speed options, as well as a choice of how many meanies you have to start with

Bonka is the first of a number of new releases for the Dragon written by John Morrison

Program *Bonka*
Price *£7 95*
Micro *Dragon 32*
Supplier *J Morrison (Micros)*
2 Glensdale Street
Leeds LS9 9JJ

MYSTERY SET

Design and Restore is a program that enables you to create characters for games and foreign languages and *Load* and *Save* them as you wish

The program comes complete with already designed characters for *Asteroids Pacman* and *Robot* the last being a "mystery set

Program *Design and Restore*
Price *£9 99*
Micro *Vic20*
Supplier *Kayde Electronic Systems*
The Conge
Great Yarmouth
Norfolk NR30 1PJ

****

COMING SOON!

Valhalla is an animated graphics adventure whose undisguised intention is to steal the title of "best micro adventure game bar none" from *The Hobbit*

The 48K Spectrum program, which will be released on July 15, uses a new operating system *MOVISOFT* and boasts a number of *Hobbit*-like features There are 20 significant characters each with their own aims and objectives

You are a minor god set the task of recovering Odin's Golden Helmet To complete this you will also have to master three lesser tasks, one of which is to rescue *Eiden* — a maiden responsible for the Golden Apples which keep the gods youthful

The game's designer Legend claims that the program involves a sophisticated degree of interaction For example should an enemy overhear you telling a friend some important information, he will try to ruin your plans

Legend stresses that the personality of each of the characters is genuinely independent "as opposed to pseudo-independent behaviour like Thorin sitting down and singing about gold or Gandalf walking off with your door for no reason"

The moving graphics are reportedly of cartoon quality, with both background and foreground movement illustrating the events of the plot

Pretty impressive claims *Hobbit* fans will no doubt feel both intrigued and sceptical

Watch this space

New Releases is designed to let people know what software is coming on to the market If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases Popular Computing Weekly 19 Whitcomb Street London WC2 7HF



Ziggurat

Organising society

A technology has no value outside of its social significance — alone it is dead metal

So starts an interesting pamphlet by Paul Strassmann, Vice President of Xerox.

Just published the pamphlet is a modified version of probably the most successful speech at the IT82 Conference in the Barbican last December At the time the presentation was successful because it was one of the few which actually used Information technology to good effect and because it was one of the most intelligent and intelligible

The central theme of Strassmann's talk was the productivity of organisations and how the introduction of Information technology can transform the role of people and of organisations Paul Strassmann's first aim is the analysis of tasks to examine how sensible automation can benefit productivity and quality He points out that efficiency is achieved by eliminating many labour intensive office tasks and he notes that such action will materially enlarge the work of the individuals who remain

Attention is then turned towards the nature of administrative systems The traditional structures are being changed — "management is not simple any more Though the procedures remain the same, management operations and customers are becoming increasingly diverse This need to address wider horizons has been met by 'adding more standard procedures without altering the traditional organisational concepts of division of labour' The trend towards centralisation and the increase in procedural complexity is measured by what he terms the "Parkinson Ratio (after C Northcote Parkinson)

Parkinson's Ratio is given by the number of internal communications that are necessary to satisfy a single useful communication to a customer Paul Strassmann reckons that for a very efficient organisation in a competitive industrial sector it can take about 20 to 30 internal information transactions to satisfy a single customer enquiry

In the public sector the average number of transactions is thought to be in excess of 100! The suggested reason is that only highly standardised methods of handling customers are fair and equitable to the public

Information technology intelligently applied, can help to reduce Parkinson's Ratio by reducing the number of needless communications

Strassmann's first key to information technology is thus the need for new forms of organisation made possible by IT The acquisition of modern technology does not help unless new systems are created to make use of it in ways that are culturally acceptable Smaller numbers of people will be needed to manage and organise information and this *should* (can but *might not*) be used to expand the provision of services

"The huge coming expansion I see in the demand for information, on a global scale will come from information being incorporated into socially useful services says Strassmann optimistically

Paul Strassmann considers that full employment is possible in productive or unproductive societies and what matters is the total output of society If output does not change with automation then unemployment is produced Or to put it the other way for a growth in output to be achieved automation is now a necessity

But what to do with the increased output? Strassmann suggests that the increased output be used to invest in the service sector a effectiveness and that we should increase value added before cutting costs By value added he means that improvement investments should be channelled where they will increase value added through new services

Improved effectiveness of organisations is berised from reduced overhead costs and decreased burdens from over complex administrations

For maximum benefit, Information technology should be used to *simplify* organisational processes rather than just to *mechanise* existing office procedures Eliminating job steps is the key to simplification

But the vital point is that we must think in terms of 'new roles for people in organisations and in the framework of a new social economy based on new services

The pamphlet by Paul A Strassmann is available from Rank Xerox, 338 Euston Road London NW1

■

Boris Allan

Puzzle

Down on the farm

Puzzle No 57

Within easy walking distance from Lower Muddlecombe are four farms Hilltop Farm, Cowslip Farm Dewdrop Farm and Mayfield Farm

The farmyard of each is in the shape of a right angled triangle having a perimeter fence of exactly 360 yards in length Also all the sides of the farmyards are an exact number of yards

Curiously though the areas of each is different, ranging in size in the order given above with the largest farmyard at Mayfield

The other evening the four farmers were enjoying a drink together in *The Bull* when they each made the following statements

Farmer Giles My farmyard is the largest.

Farmer Miles I live at Cowslip farm and have the longest side of all the yards

Farmer Henry All of my three fences are an even number of yards

Farmer Stiles My farmyard is the smallest

Unfortunately none of these statements was true Who lives where?

Solution to Puzzle No 52

This problem requires us to find 10 primes with a common difference The lowest prime would represent the number of soldiers sent out on the first day and the common difference would equal the number in a full regiment The primes are checked for in the subroutine at Line 300

```
10 LET N = 3
15 LET L = N
20 GOSUB 300
30 IF F<>0 THEN GOTO 140
40 FOR D = N + 1 TO INT (N/1 1) STEP 2
50 LET M = N
60 FOR T = 1 TO 9
70 LET M = M + D
75 LET L = M
80 GOSUB 300
90 IF F<>0 THEN GOTO 130
100 NEXT T
110 PRINT N D
120 STOP
130 NEXT D
140 LET N = N + 2
150 GOTO 15
300 LET F = 0
310 FOR B = 3 TO (VAL STR$ SQR L) STEP 2
320 IF L/B = INT (L/B) THEN LET F = 1
330 NEXT B
340 RETURN
```

This gives the results 210 soldiers in each regiment out on the first day only 199 soldiers were sent After 10 days 2 089 men had been sent with 11 held back from the first regiment.

Winner of Puzzle No 52

The winner is Angus Kerr, Golf Road Bieldside Aberdeen who receives £10

Top 10

Dragon 32

1	(1)	The King	(Microdeal)
2	(2)	Space War	(Microdeal)
3	(3)	Planet Invasion	(Microdeal)
4	(4)	Dragon Trek	(Salamander)
5	(6)	Defence	(Microdeal)
6	(8)	[illegible]	(Microdeal)
7	(—)	Wizard War	(Salamander)
8	(7)	Chess	(Dragon Data)*
9	(—)	Katerpillar Attack	(Microdeal)
10	(—)	[illegible]	(Ampalsoft)

*Cartridge (Figures compiled by Boots & Co, London)

Spectrum

1	(1)	Flight Simulation	(Psion)
2	(2)	The Hobbit	(Melbourne House)*
3	(4)	Penetrator	(Melbourne House)*
4	(3)	Transylvanian Tower	(Richard Shepherd)*
5	(—)	3D Tanx	(DK Tronics)
6	(—)	Planet of Death	(Artic)
7	(5)	Horace Goes Skiing	(Psion/Melbourne House)
8	(6)	Vu-3D	(Psion)*
9	(—)	Sentinel	(Abacus)
10	(—)	Escape	(New Generation)

*Requires 48K.
(Figures compiled by WH Smith and Son Ltd)

Atari

1	(1)	Zaxxon	(Datasoft)
2	(8)	Astrochase	(First Star)†
3	(—)	Spider Invasion	(Cosmi)
4	(3)	Hellcat Ace	(Microprose)†
5	(2)	Miner 2049er	(Big Five)*
6	(—)	AE	(Broderbund)§
7	(9)	Pharaoh's Curse	(Synapse)†
8	(—)	Survivor	(Synapse)†‡
9	(—)	Canyon Climber	(Datasoft)
10	(10)	Protector 2	(Synapse)†

*Cartridge †32K cassette ‡32K disc §48K disc
(Figures compiled by Calisto Computers Birmingham (021-632 6458))

Vic20

1	(2)	Panic	(Bug-Byte)
2	(1)	Asteroids	(Bug-Byte)
3	(3)	Cosmiads	(Bug-Byte)
4	(5)	Wacky Waiters	(Imagine)
5	(—)	Race	(Commodore)
6	(9)	Arcadia	(Imagine)
7	(—)	Super Expander	(Commodore)*
8	(6)	[illegible]	(Commodore)
9	(7)	Introduction to Basic Part 1	(Commodore)
10	(8)	Amok	(Audiogenic)

*Cartridge (Figures compiled by Boots & Co, London)

BBC*

1	(1)	Rocket Raid	(Acornsoft)
2	(2)	Planetoid	(Acornsoft)
3	(4)	Snapper	(Acornsoft)
4	(5)	Monsters	(Acornsoft)
5	(—)	Philosophers Quest	(Acornsoft)
6	(—)	Arcadians	(Acornsoft)
7	(10)	Creative Graphics	(Acornsoft)
8	(—)	Chess	(Program Power)
9	(—)	Meteors	(Acornsoft)
10	(—)	Castle of Riddles	(Acornsoft)

*All Model B
(Figures compiled by Micro Management, Ipswich (0473 59181))

ZX81*

1	(2)	QS Scramble	(Quicksilva)
2	(5)	Mazogs	(Bug-Byte)
3	(9)	Night Gunner	(Digital Integration)
4	(1)	Flight Simulation	(Psion)
5	(3)	3D Monster Maze	(New Generation)
6	(4)	Galaxians	(Artic)
7	(7)	Chess	(Psion)
8	(6)	Space Raiders	(Psion)
9	(8)	Avenger	(Abacus)
10	(10)	Asteroids	(Silversoft)

*All 16K.
(Figures compiled by WH Smith and Son Ltd)

Books

1	(4)	Spectrum Machine Language for the Absolute Beginner *Tang*	(Melbourne House)
2	(1)	Enter the Dragon *Carter*	(Melbourne House)
3	(8)	Assembly Language Programming for the BBC Micro *Birnbaum*	(Macmillan)
4	(—)	Complete Forth *Winfield*	(Sigma)
5	(2)	Mastering the Vic20 *Jones*	(Sigma)
6	(3)	The BBC Micro — An Expert Guide, *James*	(Granada)
7	(—)	Z80 Assembly Language Programming *Leventhal*	(Osbourne)
8	(7)	Vic Programmer's Reference Guide *Commodore*	(Commodore)
9	(9)	Compute!'s First Book of Vic *various authors*	(Compute)
10	(—)	*Commodore 64 Programmer's Reference Guide, Commodore*	(Commodore)

(Figures compiled by Watford Technical Books, Watford 0923 23884)

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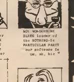
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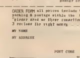
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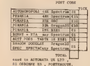


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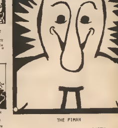


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